Note: This is a reference cited in *AP 42, Compilation of Air Pollutant Emission Factors, Volume I Stationary Point and Area Sources.* AP42 is located on the EPA web site at www.epa.gov/ttn/chief/ap42/

The file name refers to the reference number, the AP42 chapter and section. The file name "ref02_c01s02.pdf" would mean the reference is from AP42 chapter 1 section 2. The reference may be from a previous version of the section and no longer cited. The primary source should always be checked.

Background Report Reference

AP-42 Section Number: 10.6.1

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Title: Air Emissions Test Report for the Wet Scrubber, Louisiana Pacific Corporation, Dungannon, VA, March 8, 1995

ETS, Inc.

March 1995

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Rev. 91

4-91)

AIR EMISSIONS TEST REPORT
FOR THE WET SCRUBBER

PREPARED FOR

LOUISIANA PACIFIC CORPORATION
DUNGANNON, VIRGINIA

TEST DATE: MARCH 08, 1995
REPORT DATE: MARCH 28, 1995

ETS, INC.

A subsidiary of ETS International, Inc.

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ROANOKE, VA 24012

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Pollution Control Consultants
Specializing In
Toxic Emission Measurement and Control

ETS CONTRACT NUMBER
95-403-T

REPORT CERTIFICATION

The sampling and analysis performed for this report were carried out under my direction and supervision.

DATE: 3-28-95

SIGNATURE: _____

Kevin Baird
Project Manager
ETS, Inc.

I have reviewed all testing details and results in this report and hereby certify that the test report is authentic and accurate.

DATE: 3/28/95

SIGNATURE: _____

Andrew A. Hetz
Manager - Field Services
ETS, Inc.

RECEIVED
MAR 29 1995
LOUISIANA PACIFIC CORP.
HAYWARD, WISCONSIN

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1.0 INTRODUCTION

1.1 Background: An air emissions diagnostic test program was conducted at the inlet and outlet of the wet scrubber serving the strandboard manufacturing plant at Louisiana Pacific Corporation in Dungannon, Virginia. The test program was performed on March 08, 1995 by ETS, Incorporated (ETS) of Roanoke, Virginia. ETS personnel participating in the test program were Kevin Baird, Lance Humphries, Carl Powell, and Colgate Selden. Program coordination was provided by Susan Somers and Mickey Mullins of Louisiana Pacific.

1.2 Objective: The objective of the diagnostic test program was to evaluate the particulate, calcium, iron, manganese, phosphorus, potassium, sodium, and sulfur emissions from the wet scrubber inlet and outlet. Particle size testing was also conducted.

1.3 Test Program: Three 60-minute tests were conducted at the inlet and outlet to the wet scrubber. Testing was conducted in accordance with the U.S. Environmental Protection Agency (EPA) reference test methods published in the Code of Federal Regulations, Title 40, Part 60 (40 CFR 60), Appendix A. Appendix A of this report contains a complete test log detailing the date and time of each test run.

2.0 SUMMARY OF RESULTS

Table 1 presents the results of the testing for particulate and metals emissions at the scrubber inlet, and the outlet results are summarized in Table 2. Detailed data and results for the scrubber inlet and outlet are found in Appendices B and C.

3.0 OTHER APPLICABLE RESULTS

On March 09 through 10, 1995, particle size testing was conducted for Wheelabrator Clean Air Systems on the scrubber inlet and outlet. EPA Method 4 (from 40 CFR 60, Appendix A) was utilized as the sampling procedure. The samples were dried and an organic extraction was performed in accordance with EPA Method 202. A BACHO Particle Classifier was utilized to perform particle size classification on the inlet sample. Due to limited sample collection, the outlet sample was analyzed using X-Ray Sedigraphy. Tables 3 and 4 contain particle sizing results and particle distribution graphs for the scrubber inlet and outlet, respectively. All data and results, including raw field data and laboratory data, are included in Appendix J.

TABLE 1

SUMMARY OF PARTICULATE AND METALS EMISSIONS
LOUISIANA PACIFIC

SCRUBBER INLET

RUN I.D.	SI-M5/202-R1	SI-M5/202-R2	SI-M5/202-R3	AVERAGE
DATE	03/08/95	03/08/95	03/08/95	
TIME STARTED	09:25	12:15	18:45	
TIME ENDED	10:38	16:32	19:54	
SAMPLING PARAMETERS				
Metered Volume - dcf	39.408	39.447	34.031	37.629
Corrected Volume - dscf	35.407	35.635	30.576	33.873
Total Test Time - min	60	60	60	60
% Isokinetics	104.0	107.1	94.0	101.7
GAS PARAMETERS				
Gas Temperature - ° F	192	180	170	181
Oxygen - %	17.5	17.7	17.9	17.7
Carbon Dioxide - %	3.0	2.9	2.8	2.9
Moisture - %	21.9	20.1	23.8	21.9
GAS FLOWRATE				
Velocity - ft/sec	84.78	79.49	80.28	81.52
Actual Volume - acfm	63921	59935	60531	61462
Standard Volume - dscfm	37009	36166	35365	36180
SUSPENDED PARTICULATE EMISSIONS				
Conc. - gr/dscf	0.251	0.282	0.301	0.278
Mass Rate - lb/hr	79.49	87.53	91.26	86.09
CONDENSIBLE PARTICULATE EMISSIONS				
Conc. - gr/dscf	0.047	0.025	0.021	0.031
Mass Rate - lb/hr	14.76	7.70	6.25	9.57
TOTAL PARTICULATE EMISSIONS				
Conc. - gr/dscf	0.297	0.307	0.322	0.309
Mass Rate - lb/hr	94.25	95.24	97.52	95.67
METALS EMISSIONS - (lb/hr)				
Calcium	1.6343	1.9574	2.0792	1.8903
Iron	0.1021	0.0926	0.1496	0.1147
Manganese	0.0737	0.0696	0.0843	0.0759
Phosphorus	0.1195	0.1220	0.1271	0.1229
Potassium	3.8451	3.0528	2.9880	3.2953
Sodium	1.6668	0.8417	1.1817	1.2301
Sulfur	0.6108	0.6466	0.7980	0.6851

NOTE: All metal components were blank corrected in accordance with draft EPA Method 29.

TABLE 2

SUMMARY OF PARTICULATE AND METALS EMISSIONS
LOUISIANA PACIFIC

SCRUBBER OUTLET

RUN I.D.	SO-M5/202-R1	SO-M5/202-R2	SO-M5/202-R3	AVERAGE
DATE	03/08/95	03/08/95	03/08/95	
TIME STARTED	09:25	12:15	18:45	
TIME ENDED	10:38	16:32	19:55	
SAMPLING PARAMETERS				
Metered Volume - dcf	40.010	42.552	38.317	40.293
Corrected Volume - dscf	37.162	39.582	35.498	37.414
Total Test Time - min	60	60	60	60
% Isokinetics	92.8	103.8	95.6	97.4
GAS PARAMETERS				
Gas Temperature - ° F	156	155	157	156
Oxygen - %	17.3	17.5	17.9	17.6
Carbon Dioxide - %	3.2	3.0	2.6	2.9
Moisture - %	23.9	28.6	23.9	25.5
GAS FLOWRATE				
Velocity - ft/sec	71.59	72.64	66.58	70.27
Actual Volume - acfm	53975	54769	50200	52981
Standard Volume - dscfm	32962	31407	30592	31654
FILTERABLE PARTICULATE EMISSIONS				
Conc. - gr/dscf	0.068	0.056	0.052	0.059
Mass Rate - lb/hr	19.10	15.21	13.68	15.99
CONDENSIBLE PARTICULATE EMISSIONS				
Conc. - gr/dscf	0.000	0.021	0.013	0.011
Mass Rate - lb/hr	0.00	5.73	3.29	3.01
TOTAL PARTICULATE EMISSIONS				
Conc. - gr/dscf	0.068	0.078	0.065	0.070
Mass Rate - lb/hr	19.10	20.94	16.97	19.00
METALS EMISSIONS - (lb/hr)				
Calcium	0.0623	0.0731	0.0554	0.0636
Iron	0.0209	0.0181	0.0179	0.0190
Manganese	0.0224	0.0166	0.0190	0.0194
Phosphorus	< 0.0352	< 0.0315	< 0.0342	< 0.0336
Potassium	2.9566	2.0845	2.3119	2.4510
Sodium	1.0366	0.4367	0.8285	0.7673
Sulfur	0.5785	0.4786	0.4743	0.5105

NOTE: All metal components were blank corrected in accordance with draft EPA Method 29.

TABLE 3

EPA METHOD 202/BACHO PARTICLE SIZING RESULTS
WHEELABRATOR CLEAN AIR SYSTEMS
SCRUBBER INLET

DATE	03/10/95
START TIME	09:10
END TIME	10:40

SIZE	WT. %	CUMULATIVE %
2.46	6.62	6.62
4.86	7.05	13.67
12.59	13.24	26.91
14.71	15.18	42.09
22.35	15.26	57.35
40.56	17.12	74.47
50.65	3.53	78
55.54	1.58	79.58
150	8.85	88.43

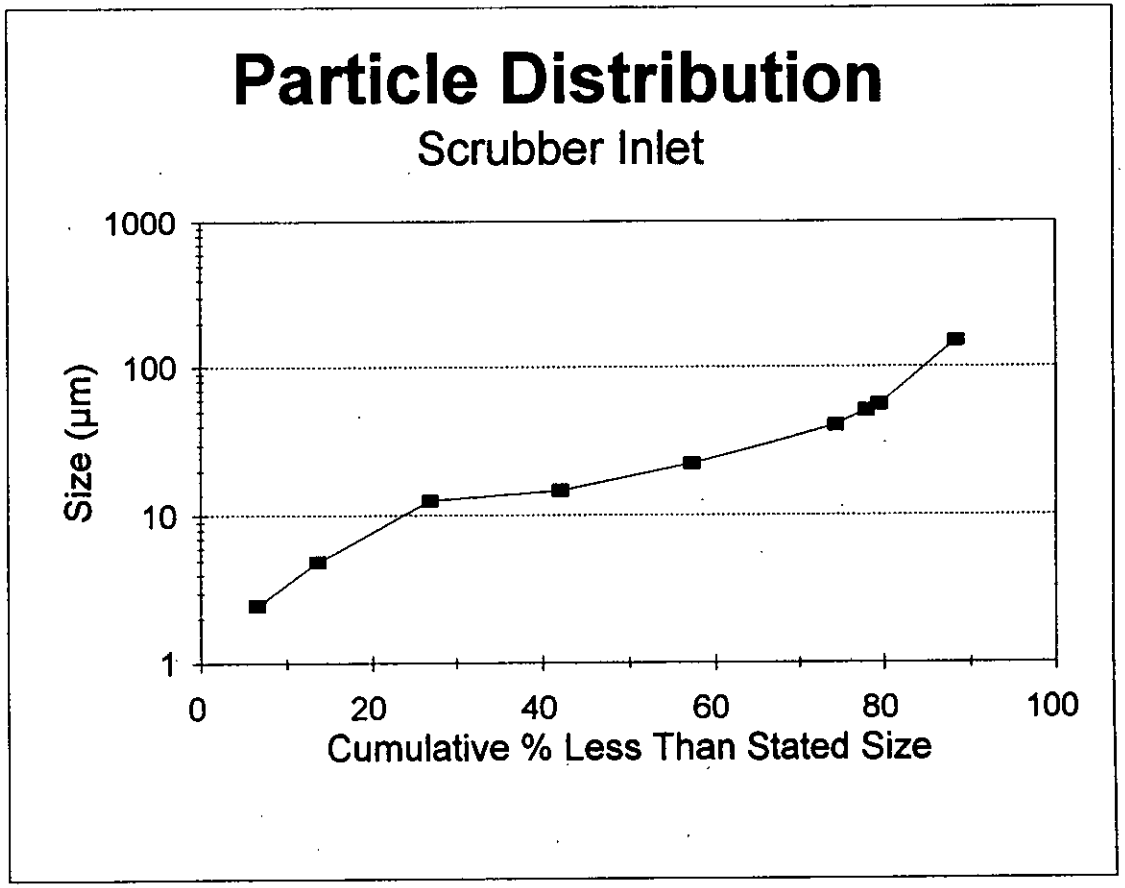
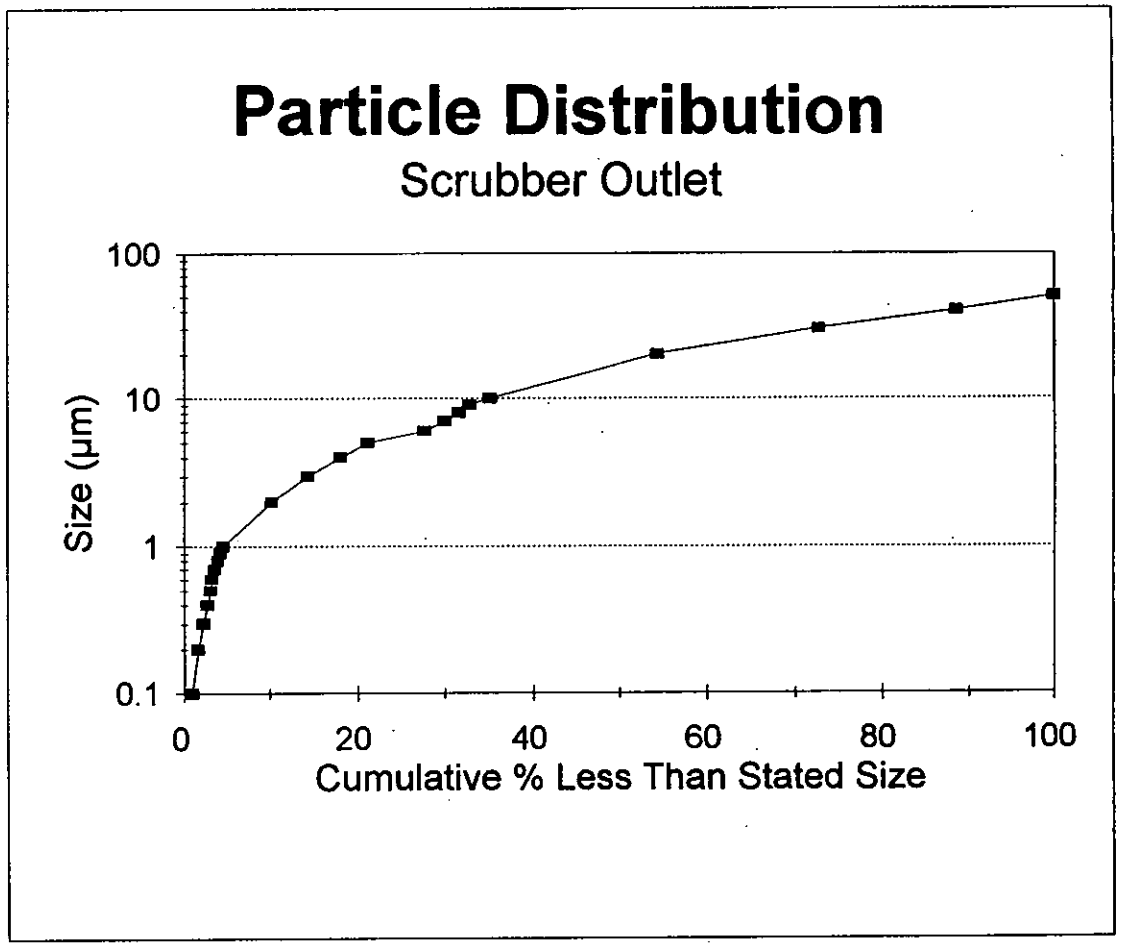


TABLE 4

EPA METHOD 202/X-RAY SEDIGRAPHY PARTICLE SIZING RESULTS
WHEELABRATOR CLEAN AIR SYSTEMS
SCRUBBER OUTLET

DATE	03/09/95
START TIME	17:57
END TIME	19:00

SIZE	WT. %	CUMULATIVE %
0.00-0.10	0.9	0.9
0.10-0.20	0.7	1.6
0.20-0.30	0.6	2.2
0.30-0.40	0.5	2.7
0.40-0.50	0.4	3.1
0.50-0.60	0.1	3.2
0.60-0.70	0.4	3.6
0.70-0.80	0.3	3.9
0.80-0.90	0.3	4.2
0.90-1.00	0.4	4.6
1.00-2.00	5.7	10.3
2.00-3.00	4.1	14.4
3.00-4.00	3.7	18.1
4.00-5.00	3.1	21.2
5.00-6.00	6.4	27.6
6.00-7.00	2.3	29.9
7.00-8.00	1.7	31.6
8.00-9.00	1.1	32.7
9.00-10.00	2.4	35.1
10.00-20.00	19.3	54.4
20.00-30.00	18.3	72.7
30.00-40.00	15.8	88.5
40.00-50.00	11.5	100.0
> 50.00	0.0	100.0



4.0 SAMPLING AND ANALYTICAL PROCEDURES

All sampling and analytical procedures followed those recommended by the EPA in 40 CFR 60, Appendix A, or other methods generally accepted by the EPA and the Virginia Department of Environmental Quality (VDEQ). These procedures were modified to incorporate EPA Method 5, EPA Method 202, and Draft EPA Method 29 into a single sampling train. The following specific methods were used:

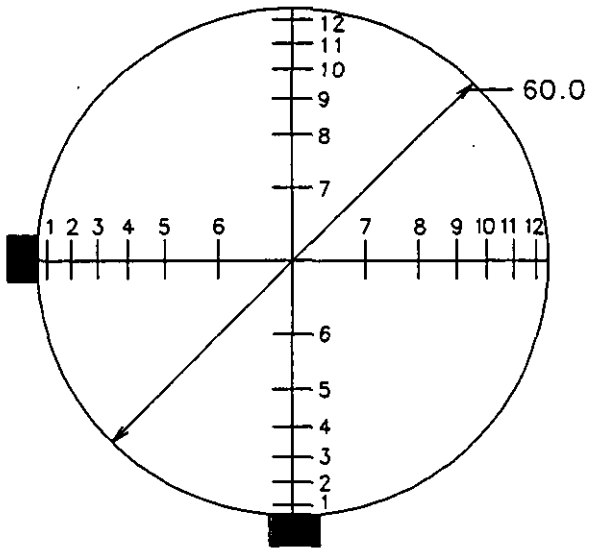
- EPA Method 1 for determination of sampling and traverse points;
- EPA Method 2 for flue gas velocity and volumetric flow rate;
- EPA Method 3 for sampling for flue gas composition and molecular weight;
- EPA Method 3A for flue gas composition and molecular weight;
- EPA Method 4 for flue gas moisture content;
- Modified EPA Method 5 for determination of total particulate emissions;
- Modified EPA approved "Methodology for the Determination of Metals Emissions in Exhaust Gases from Hazardous Waste Incineration and Similar Combustion Processes" (EPA Document 530-SW-91-010) for manganese and phosphorous emissions; (Draft EPA Method 29);
- Modified EPA Method 202 for determination of suspended and condensible particulate emissions.

Appendices E and F contain all of the field sampling data. Laboratory data for the analyses are contained in Appendices G and H.

4.1 Sampling Procedures

4.1.1 Sampling Point Determination - EPA Method 1: A total of 24 sampling and traverse points (12 for each of two ports) were utilized at the wet scrubber inlet and outlet for all pollutant and gas flow rate measurements. The scrubber inlet and outlet ducts each had a diameter of 48 inches. Figure 1 shows the location of the sampling and traverse points for the wet scrubber inlet and outlet.

4.1.2 Volumetric Measurements - EPA Method 2: EPA Method 2 was used to determine the velocity and volumetric flow rates of the stack gases. Stainless steel Type-S pitot tubes were used to measure the gas velocity heads. The pitot tubes were calibrated against a NBS traceable pitot tube in accordance with Method 2. Calibrated Type-K thermocouples were used to determine gas temperatures. Velocity and temperature measurements were made at each point in the traverse as shown in Figure 1.



POINT	% ID	DISTANCE FROM INSIDE OF PORT (inches)
1	2.1	1.02
2	6.7	3.22
3	11.8	5.67
4	17.7	8.51
5	25.0	12.00
6	35.6	17.07
7	64.4	30.93
8	75.0	36.00
9	82.3	39.49
10	88.2	42.33
11	93.3	44.78
12	97.9	46.98

INSIDE STACK DIAMETER	48.0 in	4.0 ft

Figure 1 - Sampling and Traverse Points for the Wet Scrubber Inlet and Outlet

4.1.3 Molecular Weight Determination - EPA Method 3: Gas compositional measurements (O_2 and CO_2) for determining the average molecular weight of the stack gases were done in accordance with EPA Reference Method 3. Multi-point, integrated sampling was used to obtain a constant rate sample of flue gas concurrent with the pollutant testing. Sampling was of the same duration (except purges following port changes) as the pollutant runs.

A stainless steel probe was affixed to the pollutant sampling probe for this purpose. A peristaltic pump, delivering 500 to 750 ml/min of flue gas, was used to fill a Tedlar bag. Moisture was removed from the sample gas by means of an air-cooled condenser located prior to the pump. Figure 2 shows a schematic of the Method 3 sampling train.

4.1.4 Flue Gas Moisture Content - EPA Method 4: The flue gas moisture was measured in conjunction with each of the particulate tests according to the sampling and analytical procedures outlined in EPA Method 4. The flue gas moisture for each test was determined by gravimetric analyses of the water collected in the impinger condensers of the particulate sampling train. All impingers were contained in an ice bath throughout the testing in order to assure complete condensation of the moisture in the flue gas stream. Any moisture which was not condensed in the

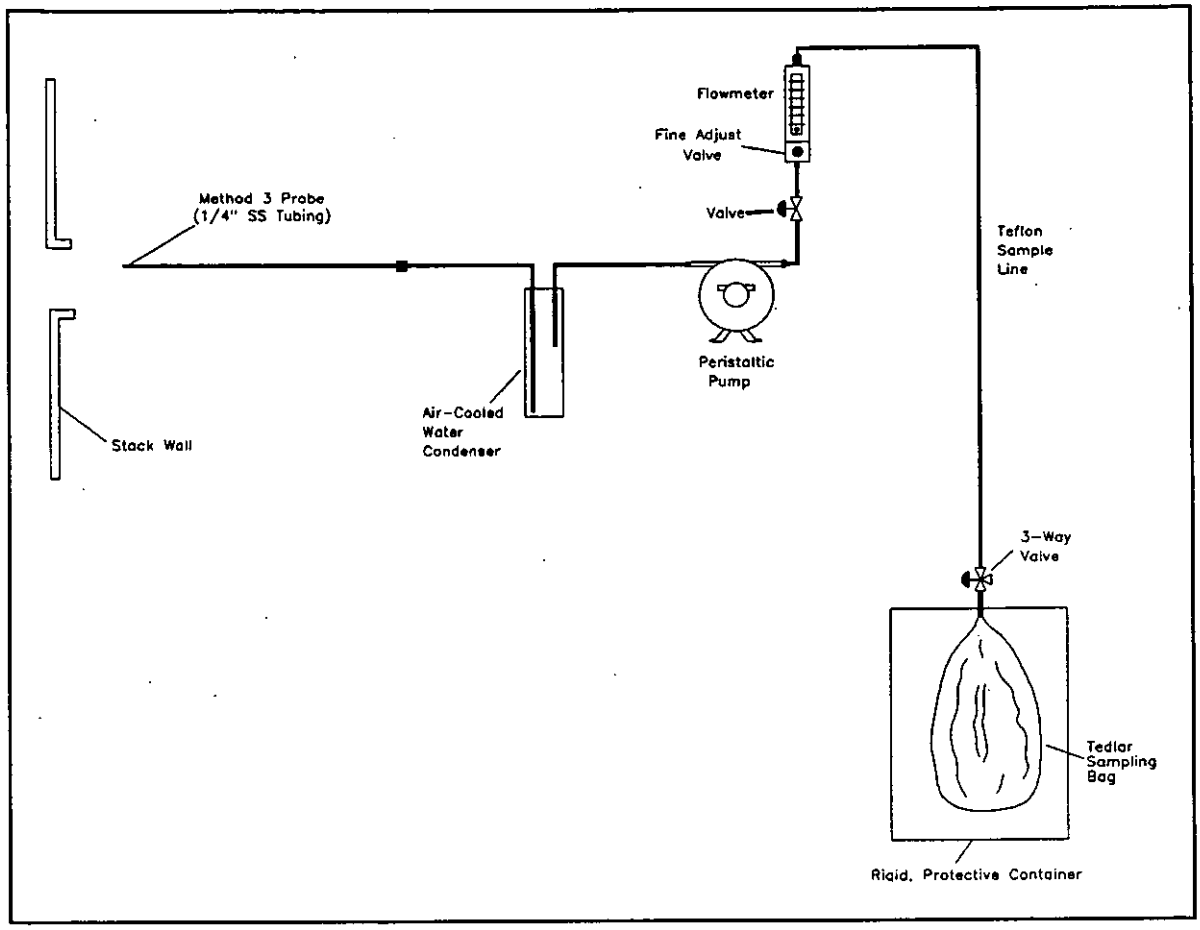


Figure 2 - EPA Method 3 Sampling Train

impingers was captured in the silica gel contained in the final impinger.

4.1.5 Particulate and Multiple Metals Sampling: Sampling for total particulate, calcium, iron, manganese, phosphorus, potassium, sodium, and sulfur was performed in accordance with EPA Method 5 of 40 CFR 60 in conjunction with EPA Method 202 of 40 CFR 51 and with Draft EPA Method 29. This methodology is commonly referred to as the Multi-Metals procedure.

4.1.5.1 Sampling Train Description: Figure 3 shows the major components of the Method 5/202 and multiple metals sampling train. A heated stainless steel probe with a teflon liner was used to withdraw the gas sample. The probe was equipped with an appropriately sized glass nozzle connected to the liner for isokinetic gas withdrawal.

From the nozzle and probe, sample gas was pulled through a heated glass filter holder which held a Pallflex ultra-pure 2500 QUAT-UP quartz filter supported on a teflon frit maintained at 248°F ± 25°F to prevent water condensation. Sample gas was subsequently passed through an impinger train consisting of five glass impingers immersed in an ice bath. The first, second, and third impingers each contained 100 milliliters of deionized distilled water. The fourth impinger was initially empty, and

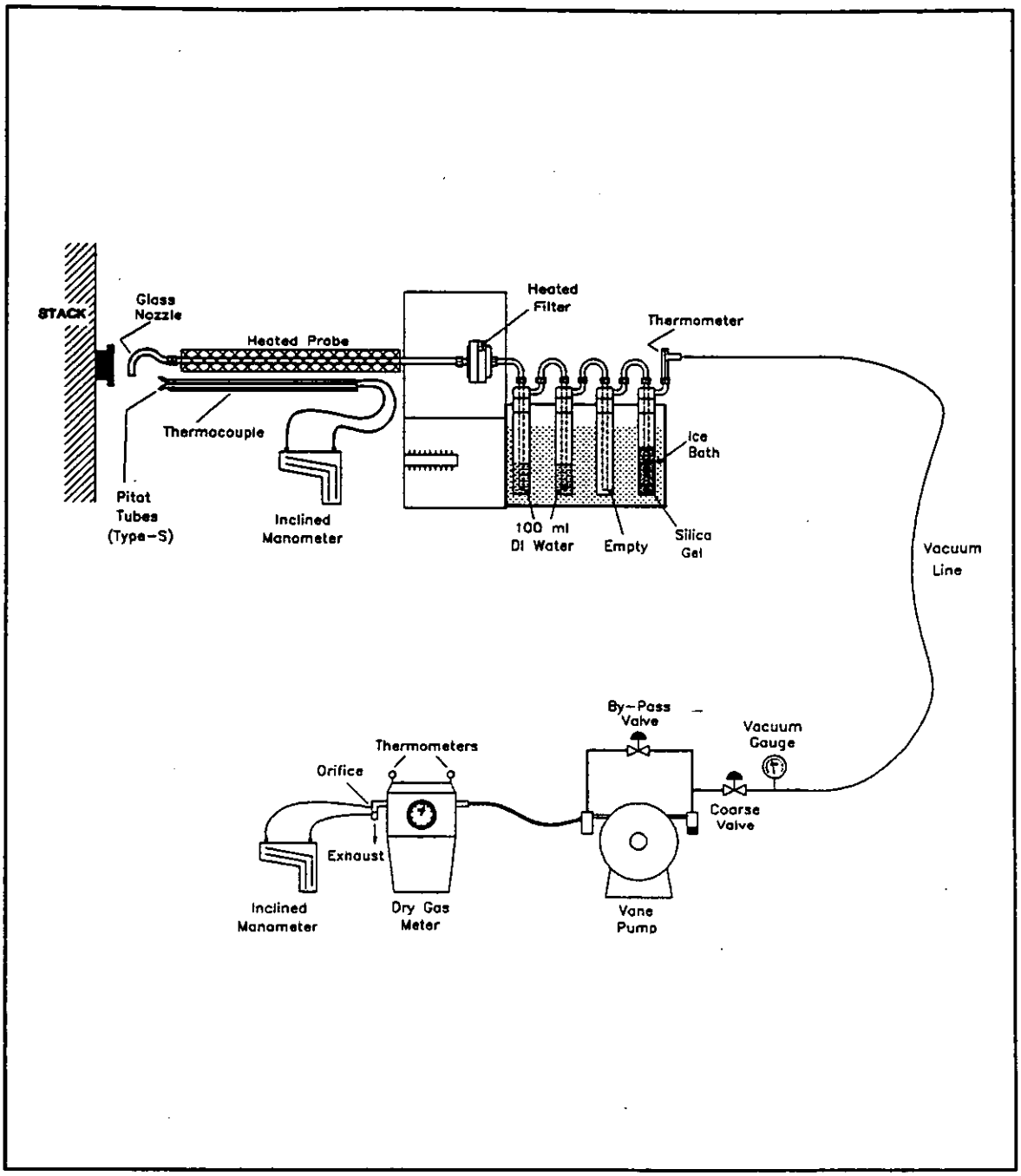


Figure 3 - EPA Method 5/202 and Multiple Metals Sampling Train

the fifth initially contained approximately 200 grams of silica gel.

4.1.5.2 Sampling Train Operation: Sampling was done in accordance with EPA Method 5 procedures and specifications, including leak checking and isokinetic sampling rate. However, stack traversing during sampling was not performed due to difficulties in accessing the sampling ports. Sampling was conducted at a single point within the duct. One test run of approximately 60 minutes was performed at both the inlet and outlet.

4.1.5.3 Sample Recovery and Clean-Up: Recovery of the front-half of the sampling train (probe plus filter and associated glassware) was performed in accordance with EPA Method 5 procedures. The probe and front-half glassware were rinsed with acetone three times each and brushed between rinses with a Teflon fiber brush. Following the acetone rinse, the probe and front-half glassware were rinsed with 0.1 Normal nitric acid. Exposed filters were placed back into their original tared containers.

The back-half of the sampling train (impingers plus connecting glassware) were recovered in accordance with EPA Method 202 procedures. The pH of the first impinger was measured immediately after the test. If the pH was less than 4.5, then the entire impinger train was purged for one hour using purified

air in accordance with Method 202 procedures. If the pH of the first impinger exceeded 4.5, then the purge was omitted.

After purging (if applicable), the contents of the first four impingers were measured and transferred to glass jars. The first four impingers and all back-half glassware were rinsed twice with water. All water rinses were collected with the impinger contents. The back-half glassware was then rinsed twice with methylene chloride. These rinses were collected into a separate glass jar.

The silica gel from the fifth impinger was transferred back to its original Nalgene container. The amount of moisture collected in the sampling train was quantified in order to determine the stack gas moisture content in accordance with EPA Method 4.

4.1.5.4 Field Blanks: Acetone, 0.1 Normal nitric acid, water, and methylene chloride field blanks were collected during the test program. Each blank was taken from the same reagent stock used for testing.

4.2 Analytical Procedures

4.2.1 Oxygen and Carbon Dioxide - EPA Method 3A: Oxygen and carbon dioxide concentrations of the Method 3 gas samples were measured instrumentally using continuous gas analyzers. A

Teledyne Model 320A Chemical Cell Portable O_2 Analyzer and a HORIBA Model PIR-2000 NDIR CO_2 Analyzer were used for the analyses. Each instrument conformed to the design specifications of EPA Method 3A. Prior to each series of analyses, each analyzer was zeroed using zero nitrogen, and spanned using a certified calibration gas with a concentration of 80 to 90 percent of the instrument span. Following calibration a mid range gas, 50 to 60 percent of the instrument span, was introduced to each monitor. The mid range response error never exceeded two percent of the instrument span.

4.2.2 Moisture Content Analysis- EPA Method 4: Moisture contents were determined gravimetrically in accordance with Method 4 by measuring either the volume or mass gains of each impinger in the pollutant sampling trains. Data for these measurements are included in the respective analytical appendices for each pollutant.

4.2.3 Particulate Analyses - EPA Method 5 and 202: Particulate matter was determined in accordance with EPA Method 5 and 202 procedures. Appendix G contains the laboratory data for the analysis.

The filter was desiccated and analyzed gravimetrically to a constant weight. The front-half acetone rinse was evaporated and analyzed gravimetrically to a constant weight. The front-half

particulate catch equals the sum of the front half acetone rinse and the filter, in accordance with Method 5.

The determination of the total condensible particulate matter in the back-half of the sampling train was determined in accordance with Method 202 procedures. The total sulfate concentration of the impinger contents and aqueous rinses was determined by analyzing an aliquot of the impinger water and rinses sample using ion chromatography. The impinger contents and aqueous rinses were then combined with the methylene chloride rinses and extracted twice with methylene chloride using a separatory funnel. The sample was divided into organic (methylene chloride) and inorganic (aqueous) fractions. The organic fraction was evaporated at room temperature and pressure, and the resulting residue gravimetrically analyzed to a constant weight.

The inorganic fraction was evaporated to dryness at 105°C. If the pH of the original impinger solutions was less than 4.5, then the resulting residue was redissolved in 100 milliliters of distilled water and the pH was increased using concentrated ammonium hydroxide. The resulting solution was evaporated to dryness at 105°C once more, and the residue was determined gravimetrically. If the pH of the original solution was greater than 4.5, then the addition of ammonium hydroxide was omitted.

The back-half condensible particulate catch equals the organic residue plus the inorganic residue plus the combined water removed by the acid-base reaction based on the impinger analysis for sulfate. The total particulate catch equals the front-half probe rinse and filter plus the back-half condensibles.

4.2.4 Multi-Metals Analyses - EPA Multi-Metals: The filter of the EPA Method 5/202 sampling train were analyzed for calcium, iron, manganese, phosphorus, potassium, sodium, and sulfur. Analyses of the filters were conducted after completion of the Method 5 gravimetric analyses. SW-846 Methods (atomic absorption) were used to determine the metals concentrations. Appendix H contains the laboratory report for the metals analyses.

The digested filters of the sampling train were prepared for analysis in accordance with the procedures given in the EPA method. All digestions were performed using a 600-watt microwave digester and Teflon pressure relief vessels. After preparation, the samples were analyzed with a Perkin Elmer Plasma 2000 inductively coupled plasma (ICP) atomic absorption spectrometer for calcium, iron, manganese, phosphorous, potassium, sodium, and sulfur.

Duplicate analyses were performed on all metals samples. In addition, field blanks were analyzed. Spikes were added to the samples to determine the metals recovery efficiencies.

5.0 DATA ANALYSIS

All equations and calculations used to determine the pollutant emissions in this test program are documented in Appendix D.

6.0 FIELD EQUIPMENT CALIBRATIONS

All field equipment was calibrated in accordance with the requirements of the applicable EPA Methods and those recommended within the "Quality Assurance Handbook for Air Pollution Measurement Systems: Volume III" (EPA-600/4-77-027b, August, 1977). Equipment calibration documentation is found in Appendix I.

APPENDIX A

TEST LOG

APPENDIX B

DATA AND RESULTS FOR EPA METHOD 5/202 AND MULTIPLE METALS TESTING

- SCRUBBER INLET -

RUN NUMBER	SI-M5-R1	
Date	03/08/95	
Start Time	09:25	
End Time	10:38	
Stack Diam.	48	inches
Nozzle I.D.	0.188	inches
Meter Box Gamma	0.9885	
Meter Box dH@	1.8053	
Barometric	28.20	in.Hg
Cp	0.84	
Test Duration	60	minutes

METHOD 1-4 RESULTS

Metered Volume	39.408	dcf
Volume @ Std.Cond.	35.407	dscf
% Water	21.89	%
% Isokinetics	104.0	%
Velocity	84.78	ft/sec
Actual Flow	63921	acfm
Std. Flow	47382	scfm
Dry Std. Flow	37009	dscfm

METHOD 4 DATA

	INIT. (ml)	FINAL (ml)	NET (ml)
IMP.1	375.9	528.3	152.4
IMP.2	320.4	359.8	39.4
IMP.3	0.0	0.0	0.0
IMP.4			0.0
IMP.5			0.0
IMP.6			0.0
IMP.7			0.0
TOTAL	696.3	888.1	191.8
S.G.	200.0	219.0	19.0

METHOD 3 DATA

%O2	17.5	Md	29.18
%CO2	3.0		26.73
%CO	0.0	Ps	27.38
%N2	79.5	Fo	1.133
O2+CO2	20.5	%EA	502

POINT	STACK TEMP (DegF)	STATIC (in.WC)	DP (in.WC)	DH (in.WC)	METER VOLUME (dcf)	METER TEMPERATURE INLET (DegF)	METER TEMPERATURE OUTLET (DegF)
1	196	-11.00	1.50	1.30	718.887	90	91
2	200	-11.20	1.60	1.35	758.295	87	90
3	200		1.70	1.45		87	90
4	200		1.70	1.45		88	90
5	200		1.70	1.45		88	90
6	200		1.80	1.50		89	89
7	200		1.70	1.45		89	89
8	197		1.60	1.35		89	90
9	195		1.60	1.35		90	90
10	193		1.60	1.35		90	91
11	193		1.50	1.30		90	91
12	190		1.50	1.30		90	90
13	180		1.40	1.20		87	89
14	182		1.50	1.30		88	89
15	184		1.50	1.30		89	89
16	186		1.60	1.35		89	89
17	187		1.60	1.35		89	90
18	188		1.50	1.30		90	90
19	189		1.40	1.20		90	88
20	190		1.50	1.30		90	88
21	190		1.60	1.35		90	88
22	189		1.60	1.35		90	88
23	189		1.50	1.30		90	87
24	188		1.40	1.20		90	87
					758.295		
AVG.	192	-11.10	1.57	1.34	39.408		89

LOUISIANA PACIFIC
SCRUBBER INLET
EPA METHOD 5/202 ANALYTICAL DATA AND RESULTS

SAMPLING DATA:

Run Number:	**SI-M5-R1**
Corr. Sample Volume:	35.407 dscf
Corr. Flowrate	37009 dscfm
O2 Content:	17.5 %
CO2 Content:	3.0 %

SUMMARY:

COMPONENT	NET (grams)	CORRECTED FOR BLANK (grams)
SUSPENDED PM		
Probe Wash	0.05530	0.05530
Filter	0.51970	0.51970
CONDENSIBLE PM		
Organic CPM	0.03570	0.03570
Inorganic CPM*	0.07460	0.07108
TOTAL CPM	0.11030	0.10678
TOTAL PM	0.68530	0.68178

ANALYTICAL DATA:

METHOD 5 COMPONENTS	TARE (grams)	FINAL (grams)	NET (grams)	VOLUME (ml)
Acetone Probe Wash	67.20330	67.25860	0.05530	60.0
Acetone Blank Residue	64.95670	64.95560	0.00000	80.0
Applicable Acetone Blank			0.00000	
Max. Allowable Blank			0.00047	
Filter	0.36510	0.88480	0.51970	

METHOD 202 COMPONENTS	TARE (grams)	FINAL (grams)	NET (grams)	REAGENT VOLUME (ml)	CONC. (mg/l)
Volume of Cont.#4				440.0	
Organic CPM (Uncorr.)	131.16670	131.20240	0.03570	250.0	
MeCl2 Blank	134.35890	134.35890	0.00000	125.0	
Inorganic CPM (Uncorr.)	197.88810	197.96270	0.07460	440.0	
H2O Blank	132.33750	132.33950	0.00200	250.0	
Inorganic CPM (Corr.)			0.07460		

PARTICULATE EMISSIONS:

	FILTERABLE	CPM	TOTAL
Actual Grain Loading (gr/dscf)	0.2506	0.0465	0.2971
Corrected to 7% O2 (gr/dscf)	1.0244	0.1902	1.2147
Corrected to 12% CO2 (gr/dscf)	1.0023	0.1861	1.1885
Mass Rate (lb/hr)	79.49	14.76	94.25

LOUISIANA PACIFIC
SCRUBBER INLET
MULTIPLE METALS ANALYTICAL DATA AND RESULTS

SAMPLING DATA:

Run Number:	SI-M5-R1
Corr. Sample Volume:	35.407 dscf
Corr. Flowrate	37009 dscfm
O2 Content:	17.5 %
CO2 Content:	3 %

TRACE METALS ANALYTICAL DATA AND RESULTS:

COMPONENT		LABORATORY DATA			METALS EMISSIONS			
					CONCENTRATION			MASS RATE
		Sample (µg)	Blank (µg)	Total (µg)	ACTUAL ug/dscm	@ 12% CO2 ug/dscm	@7% O2 ug/dscm	lb/hr
Calcium	Ca	11820.00	0.00	11820.00	11789.271	47157.085	48197.315	1.63E+00
Iron	Pb	777.00	38.85	738.15	736.231	2944.924	3009.886	1.02E-01
Manganese	Mn	534.00	0.90	533.10	531.714	2126.856	2173.772	7.37E-02
Phosphorus	P	864.00	0.00	864.00	861.754	3447.015	3523.052	1.19E-01
Potassium	K	27810.00	0.00	27810.00	27737.702	110950.807	113398.251	3.85E+00
Sodium	Na	12690.00	634.50	12055.50	12024.159	48096.636	49157.591	1.67E+00
Sulfur	S	4650.00	232.50	4417.50	4406.016	17624.063	18012.829	6.11E-01

NOTE: All metal components were blank corrected in accordance with draft EPA Method 29.

RUN NUMBER	SI-M5-R2	
Date	03/08/95	
Start Time	12:15	
End Time	16:32	
Stack Diam.	48	inches
Nozzle I.D.	0.188	inches
Meter Box Gamma	0.9885	
Meter Box dH@	1.8053	
Barometric	28.20	in.Hg
Cp	0.84	
Test Duration	60	minutes

METHOD 4 DATA

	INIT. (ml)	FINAL (ml)	NET (ml)
IMP.1	372.1	532.8	160.7
IMP.2	320.5	336.9	16.4
IMP.3	0.0	0.0	0.0
IMP.4			0.0
IMP.5			0.0
IMP.6			0.0
IMP.7			0.0
TOTAL	692.6	869.7	177.1
S.G.	200.0	212.9	12.9

METHOD 1-4 RESULTS

Metered Volume	39.447	dcf
Volume @ Std.Cond.	35.635	dscf
% Water	20.06	%
% Isokinetics	107.1	%
Velocity	79.49	ft/sec
Actual Flow	59935	acfm
Std. Flow	45244	scfm
Dry Std. Flow	36166	dscfm

METHOD 3 DATA

%O2	17.7	Md	29.17
%CO2	2.9	Ms	26.93
%CO	0.0		27.39
%N2	79.4	Fo	1.103
O2+CO2	20.6	%EA	543

POINT	STACK TEMP (DegF)	STATIC (in.WC)	DP (in.WC)	DH (in.WC)	METER VOLUME (dcf)	METER TEMPERATURE INLET (DegF)	METER TEMPERATURE OUTLET (DegF)
1	184	-11.00	1.10	0.94	758.467	81	83
2	186		1.20	1.00	797.914	81	83
3	186		1.30	1.10		84	83
4	186		1.30	1.10		84	83
5	186		1.30	1.10		85	83
6	185		1.40	1.20		86	84
7	185		1.40	1.20		86	84
8	184		1.40	1.20		87	84
9	183		1.30	1.10		87	84
10	182		1.30	1.10		88	84
11	182		1.20	1.00		87	85
12	182		1.20	1.00		87	85
13	176		1.50	1.30		86	87
14	176		1.50	1.30		87	88
15	175		1.50	1.30		87	88
16	174		1.40	1.20		87	88
17	171		1.30	1.10		87	89
18	176		1.50	1.30		89	87
19	172		1.60	1.35		89	87
20	173		1.70	1.45		89	87
21	173		1.70	1.45		89	87
22	181		1.70	1.45		88	87
23	184		1.60	1.35		88	87
24	186		1.60	1.35		87	87
					797.914		
AVG.	180	-11.00	1.42	1.21	39.447		86

LOUISIANA PACIFIC
SCRUBBER INLET
EPA METHOD 5/202 ANALYTICAL DATA AND RESULTS

SAMPLING DATA:

Run Number:	SI-M5-R2	
Corr. Sample Volume:	35.635	dscf
Corr. Flowrate	36166	dscfm
O2 Content:	17.7	%
CO2 Content:	2.9	%

SUMMARY:

COMPONENT	NET (grams)	CORRECTED FOR BLANK (grams)
SUSPENDED PM		
Probe Wash	0.42050	0.42050
Filter	0.23160	0.23160
CONDENSIBLE PM		
Organic CPM	0.02740	0.02740
Inorganic CPM*	0.03300	0.03000
TOTAL CPM	0.06040	0.05740
TOTAL PM	0.71250	0.70950

ANALYTICAL DATA:

METHOD 5 COMPONENTS	TARE (grams)	FINAL (grams)	NET (grams)	VOLUME (ml)
Acetone Probe Wash	64.84980	65.27030	0.42050	75.0
Acetone Blank Residue	64.95670	64.95560	0.00000	80.0
Applicable Acetone Blank			0.00000	
Max. Allowable Blank			0.00059	
Filter	0.36420	0.59580	0.23160	

METHOD 202 COMPONENTS	TARE (grams)	FINAL (grams)	NET (grams)	REAGENT VOLUME (ml)	CONC. (mg/l)
Volume of Cont.#4				375.0	
Organic CPM (Uncorr.)	134.33100	134.35840	0.02740	250.0	
MeCl2 Blank	134.35890	134.35890	0.00000	125.0	
Inorganic CPM (Uncorr.)	207.68140	207.71440	0.03300	375.0	
H2O Blank	132.33750	132.33950	0.00200	250.0	
Inorganic CPM (Corr.)			0.03300		

PARTICULATE EMISSIONS:

	FILTERABLE	CPM	TOTAL
Actual Grain Loading (gr/dscf)	0.2824	0.0249	0.3072
Corrected to 7% O2 (gr/dscf)	1.2265	0.1080	1.3345
Corrected to 12% CO2 (gr/dscf)	1.1684	0.1028	1.2712
Mass Rate (lb/hr)	87.53	7.70	95.24

LOUISIANA PACIFIC
SCRUBBER INLET
MULTIPLE METALS ANALYTICAL DATA AND RESULTS

SAMPLING DATA:

Run Number:	**SI-M5-R2**
Corr. Sample Volume:	35.635 dscf
Corr. Flowrate	36166 dscfm
O2 Content:	17.7 %
CO2 Content:	2.9 %

TRACE METALS ANALYTICAL DATA AND RESULTS:

COMPONENT		LABORATORY DATA			METALS EMISSIONS			
					CONCENTRATION			MASS RATE
		Sample (µg)	Blank (µg)	Total (µg)	ACTUAL ug/dscm	@ 12% CO2 ug/dscm	@7% O2 ug/dscm	lb/hr
Calcium	Ca	14580.00	0.00	14580.00	14448.897	59788.539	62762.396	1.96E+00
Iron	Pb	726.00	36.30	689.70	683.498	2828.269	2968.945	9.26E-02
Manganese	Mn	519.00	0.90	518.10	513.441	2124.585	2230.260	6.96E-02
Phosphorus	P	909.00	0.00	909.00	900.826	3727.557	3912.964	1.22E-01
Potassium	K	22740.00	0.00	22740.00	22535.522	93250.438	97888.676	3.05E+00
Sodium	Na	6600.00	330.00	6270.00	6213.620	25711.532	26990.413	8.42E-01
Sulfur	S	5070.00	253.50	4816.50	4773.190	19751.132	20733.545	6.47E-01

NOTE: All metal components were blank corrected in accordance with draft EPA Method 29.

RUN NUMBER	SI-M5-R3	
Date	03/08/95	
Start Time	18:45	
End Time	19:54	
Stack Diam.	48	inches
Nozzle I.D.	0.188	inches
Meter Box Gamma	0.9885	
Meter Box dH@	1.8053	
Barometric	28.20	in.Hg
Cp	0.84	
Test Duration	60	minutes

METHOD 1-4 RESULTS

Metered Volume	34.031	dcf
Volume @ Std.Cond.	30.576	dscf
% Water	23.85	%
% Isokinetics	94.0	%
Velocity	80.28	ft/sec
Actual Flow	60531	acfm
Std. Flow	46440	scfm
Dry Std. Flow	35365	dscfm

METHOD 4 DATA

	INIT. (ml)	FINAL (ml)	NET (ml)
IMP.1	370.8	545.3	174.5
IMP.2	318.7	336.0	17.3
IMP.3	0.0	0.0	0.0
IMP.4			0.0
IMP.5			0.0
IMP.6			0.0
IMP.7			0.0
TOTAL	689.5	881.3	191.8
S.G.	200.0	211.6	11.6

METHOD 3 DATA

%O2	17.9	Md	29.16
%CO2	2.8	Ms	26.50
%CO	0.0	Ps	27.39
%N2	79.3	Fo	1.071
O2+CO2	20.7	%EA	590

POINT	STACK TEMP (DegF)	STATIC (in.WC)	DP (in.WC)	DH (in.WC)	METER VOLUME (dcf)	METER TEMPERATURE INLET (DegF)	METER TEMPERATURE OUTLET (DegF)
1	175	-11.10	1.40	1.20	391.387	88	82
2	173	-11.00	1.40	1.20	425.418	87	81
3	172		1.50	1.30		86	80
4	171		1.50	1.30		86	79
5	170		1.60	1.35		87	79
6	170		1.60	1.35		88	80
7	170		1.70	1.45		89	81
8	171		1.70	1.45		90	82
9	173		1.80	1.50		90	82
10	173		1.70	1.45		91	83
11	174		1.70	1.45		92	84
12	169		1.60	1.35		93	85
13	168		1.20	1.00		92	88
14	168		1.20	1.00		93	89
15	171		1.30	1.10		94	90
16	170		1.30	1.10		94	90
17	169		1.30	1.10		95	91
18	168		1.40	1.20		95	92
19	165		1.40	1.20		96	92
20	166		1.40	1.20		95	92
21	165		1.30	1.10		96	92
22	167		1.30	1.10		96	93
23	170		1.20	1.00		95	92
24	171		1.20	1.00		95	92
					425.418		
AVG.	170	-11.05	1.45	1.23	34.031		89

LOUISIANA PACIFIC
SCRUBBER INLET
EPA METHOD 5/202 ANALYTICAL DATA AND RESULTS

SAMPLING DATA:

Run Number:	**SI-M5-R3**
Corr. Sample Volume:	30.576 dscf
Corr. Flowrate	35365 dscfm
O2 Content:	17.9 %
CO2 Content:	2.8 %

SUMMARY:

COMPONENT	NET (grams)	CORRECTED FOR BLANK (grams)
SUSPENDED PM		
Probe Wash	0.44290	0.44290
Filter	0.15370	0.15370
CONDENSIBLE PM		
Organic CPM	0.01760	0.01760
Inorganic CPM*	0.02680	0.02328
TOTAL CPM	0.04440	0.04088
TOTAL PM	0.64100	0.63748

ANALYTICAL DATA:

METHOD 5 COMPONENTS	TARE (grams)	FINAL (grams)	NET (grams)	VOLUME (ml)
Acetone Probe Wash	65.16540	65.60830	0.44290	75.0
Acetone Blank Residue	64.95670	64.95560	0.00000	80.0
Applicable Acetone Blank			0.00000	
Max. Allowable Blank			0.00059	
Filter	0.39200	0.54570	0.15370	

METHOD 202 COMPONENTS	TARE (grams)	FINAL (grams)	NET (grams)	REAGENT VOLUME (ml)	CONC. (mg/l)
Volume of Cont.#4				440.0	
Organic CPM (Uncorr.)	137.42660	137.44420	0.01760	250.0	
MeCl2 Blank	134.35890	134.35890	0.00000	125.0	
Inorganic CPM (Uncorr.)	194.95430	194.98110	0.02680	440.0	
H2O Blank	132.33750	132.33950	0.00200	250.0	
Inorganic CPM (Corr.)			0.02680		

PARTICULATE EMISSIONS:

	FILTERABLE	CPM	TOTAL
Actual Grain Loading (gr/dscf)	0.3011	0.0206	0.3217
Corrected to 7% O2 (gr/dscf)	1.3950	0.0956	1.4905
Corrected to 12% CO2 (gr/dscf)	1.2903	0.0884	1.3787
Mass Rate (lb/hr)	91.26	6.25	97.52

LOUISIANA PACIFIC
SCRUBBER INLET
MULTIPLE METALS ANALYTICAL DATA AND RESULTS

SAMPLING DATA:

Run Number:	**SI-M5-R3**	
Corr. Sample Volume:	30.576	dscf
Corr. Flowrate	35365	dscfm
O2 Content:	17.9	%
CO2 Content:	2.8	%

TRACE METALS ANALYTICAL DATA AND RESULTS:

COMPONENT		LABORATORY DATA			METALS EMISSIONS			
					CONCENTRATION			MASS RATE
		Sample (µg)	Blank (µg)	Total (µg)	ACTUAL ug/dscm	@ 12% CO2 ug/dscm	@7% O2 ug/dscm	lb/hr
Calcium	Ca	13590.00	0.00	13590.00	15696.088	67268.949	72725.208	2.08E+00
Iron	Pb	1029.00	51.45	977.55	1129.044	4838.761	5231.238	1.50E-01
Manganese	Mn	552.00	0.90	551.10	636.506	2727.882	2949.144	8.43E-02
Phosphorus	P	831.00	0.00	831.00	959.783	4113.355	4446.994	1.27E-01
Potassium	K	19530.00	0.00	19530.00	22556.630	96671.271	104512.386	2.99E+00
Sodium	Na	8130.00	406.50	7723.50	8920.437	38230.444	41331.357	1.18E+00
Sulfur	S	5490.00	274.50	5215.50	6023.764	25816.130	27910.105	7.98E-01

NOTE: All metal components were blank corrected in accordance with draft EPA Method 29.

APPENDIX C

DATA AND RESULTS FOR EPA METHOD 5/202 AND MULTIPLE METALS TESTING

- SCRUBBER OUTLET -

RUN NUMBER	SO-M5-R1	
Date	03/08/95	
Start Time	09:25	
End Time	10:38	
Stack Diam.	48	inches
Nozzle I.D.	0.216	inches
Meter Box Gamma	0.9993	
Meter Box dH@	1.7269	
Barometric	28.20	in.Hg
Cp	0.84	
Test Duration	60	minutes

METHOD 4 DATA

	INIT. (ml)	FINAL (ml)	NET (ml)
IMP.1	408.0	582.4	174.4
IMP.2	310.7	374.1	63.4
IMP.3	0.0	0.0	0.0
IMP.4			0.0
IMP.5			0.0
IMP.6			0.0
IMP.7			0.0
TOTAL	718.7	956.5	237.8
S.G.	200.0	210.6	10.6

METHOD 1-4 RESULTS

Metered Volume	40.010	dcf
Volume @ Std.Cond.	37.162	dscf
% Water	23.93	%
% Isokinetics	92.8	%
Velocity	71.59	ft/sec
Actual Flow	53975	acfm
Std. Flow	43333	scfm
Dry Std. Flow	32962	dscfm

METHOD 3 DATA

%O2	17.3	Md	29.20
%CO2	3.2	Ms	26.52
%CO	0.0	Ps	28.00
%N2	79.5	Fo	1.125
O2+CO2	20.5	%EA	469

POINT	STACK TEMP (DegF)	STATIC (in.WC)	DP (in.WC)	DH (in.WC)	METER VOLUME (dcf)	METER TEMPERATURE INLET (DegF)	METER TEMPERATURE OUTLET (DegF)
1	150	-2.70	0.64	0.75	969.685	76	76
2	151	-2.70	0.69	0.81	985.025	77	76
3	154		0.71	0.90		78	76
4	156		1.05	1.23	986.863	78	76
5	158		1.30	1.50	1011.533	81	76
6	157		1.60	1.90		82	76
7	158		1.45	1.70		82	76
8	159		1.60	1.87		82	76
9	159		1.40	1.64		83	76
10	158		1.30	1.52		83	76
11	154		1.50	1.75		77	75
12	155		1.45	1.70		74	75
13	158		1.00	1.17		74	75
14	157		1.25	1.50		75	75
15	155		1.25	1.50		76	75
16	156		1.50	1.75		77	76
17	153		1.50	1.75		78	76
18	154		1.20	1.40		79	76
19	154		0.98	1.15		80	76
20	154		1.01	1.13		81	76
					1011.533		
AVG.	156	-2.70	1.22	1.43	40.010		77

LOUISIANA PACIFIC
SCRUBBER OUTLET
EPA METHOD 5/202 ANALYTICAL DATA AND RESULTS

SAMPLING DATA:

Run Number:	SO-M5-R1	
Corr. Sample Volume:	37.162	dscf
Corr. Flowrate	32962	dscfm
O2 Content:	17.3	%
CO2 Content:	3.2	%

SUMMARY:

COMPONENT	NET (grams)	CORRECTED FOR BLANK (grams)
SUSPENDED PM		
Probe Wash	0.00160	0.00160
Filter	0.16120	0.16120
CONDENSIBLE PM		
Organic CPM	0.00200	0.00000
Inorganic CPM	0.00360	0.00000
TOTAL CPM	0.00560	0.00000
TOTAL PM	0.16840	0.16280

ANALYTICAL DATA:

METHOD 5 COMPONENTS	TARE (grams)	FINAL (grams)	NET (grams)	VOLUME (ml)
Acetone Probe Wash	64.13070	64.13230	0.00160	125.0
Acetone Blank Residue	64.95670	64.95560	0.00000	80.0
Applicable Acetone Blank			0.00000	
Max. Allowable Blank			0.00098	
Filter	0.36540	0.52660	0.16120	

METHOD 202 COMPONENTS	TARE (grams)	FINAL (grams)	NET (grams)	REAGENT VOLUME (ml)	CONC. (mg/l)
Volume of Cont.#4				520.0	
Organic CPM (Uncorr.)	131.70730	131.70930	0.00200	250.0	
MeCl2 Blank	134.35890	134.35890	0.00000	125.0	
Inorganic CPM (Uncorr.)	195.94410	195.94770	0.00360	520.0	
H2O Blank	132.33750	132.33950	0.00200	250.0	
Inorganic CPM (Corr.)			0.00360		

PARTICULATE EMISSIONS:

	FILTERABLE	CPM	TOTAL
Actual Grain Loading (gr/dscf)	0.0676	0.0000	0.0676
Corrected to 7% O2 (gr/dscf)	0.2610	0.0000	0.2610
Corrected to 12% CO2 (gr/dscf)	0.2535	0.0000	0.2535
Mass Rate (lb/hr)	19.10	0.00	19.10

LOUISIANA PACIFIC
SCRUBBER OUTLET
MULTIPLE METALS ANALYTICAL DATA AND RESULTS

SAMPLING DATA:

Run Number:	**SO-M5-R1**	
Corr. Sample Volume:	37.162	dscf
Corr. Flowrate	32962	dscfm
O2 Content:	17.3	%
CO2 Content:	3.2	%

TRACE METALS ANALYTICAL DATA AND RESULTS:

		LABORATORY DATA			METALS EMISSIONS			
					CONCENTRATION			MASS RATE
COMPONENT		Sample (µg)	Blank (µg)	Total (µg)	ACTUAL ug/dscm	@ 12% CO2 ug/dscm	@7% O2 ug/dscm	lb/hr
Calcium	Ca	531.00	0.00	531.00	504.608	1892.280	1948.347	6.23E-02
Iron	Pb	192.00	13.80	178.20	169.343	635.036	653.852	2.09E-02
Manganese	Mn	192.00	0.90	191.10	181.602	681.007	701.185	2.24E-02
Phosphorus	P	< 300.00	0.00	< 300.00	< 285.089	< 1069.084	< 1100.761	< 3.52E-02
Potassium	K	25200.00	0.00	25200.00	23947.492	89803.096	92463.929	2.96E+00
Sodium	Na	9300.00	465.00	8835.00	8395.877	31484.538	32417.413	1.04E+00
Sulfur	S	5190.00	259.50	4930.50	4685.441	17570.403	18091.008	5.78E-01

NOTE: All metal components were blank corrected in accordance with draft EPA Method 29.

RUN NUMBER	SO-M5-R2	
Date	03/08/95	
Start Time	12:15	
End Time	16:32	
Stack Diam.	48	inches
Nozzle I.D.	0.216	inches
Meter Box Gamma	0.9993	
Meter Box dH@	1.7269	
Barometric	28.20	in.Hg
Cp	0.84	
Test Duration	60	minutes

METHOD 4 DATA

	INIT. (ml)	FINAL (ml)	NET (ml)
IMP.1	373.6	696.9	323.3
IMP.2	311.8	315.8	4.0
IMP.3	0.0	0.0	0.0
IMP.4			0.0
IMP.5			0.0
IMP.6			0.0
IMP.7			0.0
TOTAL	685.4	1012.7	327.3
S.G.	200.0	210.0	10.0

METHOD 1-4 RESULTS

Metered Volume	42.552	dcf
Volume @ Std.Cond.	39.582	dscf
% Water	28.63	%
% Isokinetics	103.8	%
Velocity	72.64	ft/sec
Actual Flow	54769	acfm
Std. Flow	44006	scfm
Dry Std. Flow	31407	dscfm

METHOD 3 DATA

%O2	17.5	Md	29.18
%CO2	3.0	Ms	25.98
%CO	0.0	Ps	28.00
%N2	79.5	Fo	1.133
O2+CO2	20.5	%EA	502

POINT	STACK TEMP (DegF)	STATIC (in.WC)	DP (in.WC)	DH (in.WC)	METER VOLUME (dcf)	METER TEMPERATURE INLET (DegF)	METER TEMPERATURE OUTLET (DegF)
1	147	-2.80	0.65	0.76	12.742	75	74
2	147	-2.60	0.70	0.82	33.340	76	74
3	154		0.75	0.88		78	74
4	157		1.00	1.17	34.171	78	74
5	156		1.25	1.50	56.125	80	74
6	157		1.60	1.90		81	75
7	158		1.50	1.80		82	75
8	159		1.70	2.00		83	75
9	158		1.50	1.80		84	75
10	159		1.30	1.52		84	75
11	154		1.50	1.80		77	74
12	154		0.99	1.15		73	71
13	158		1.20	1.40		74	72
14	158		1.25	1.50		76	73
15	155		1.50	1.80		77	73
16	155		1.60	1.90		79	73
17	153		1.40	1.60		80	73
18	153		1.15	1.35		81	74
19	154		0.98	1.15		82	74
20	154		1.10	1.30		81	74
					56.125		
AVG.	155	-2.70	1.23	1.46	42.552		76

LOUISIANA PACIFIC
SCRUBBER OUTLET
EPA METHOD 5/202 ANALYTICAL DATA AND RESULTS

SAMPLING DATA:

Run Number:	SO-M5-R2	
Corr. Sample Volume:	39.582	dscf
Corr. Flowrate	31407	dscfm
O2 Content:	17.5	%
CO2 Content:	3.0	%

SUMMARY:

COMPONENT	NET (grams)	CORRECTED FOR BLANK (grams)
SUSPENDED PM		
Probe Wash	0.00120	0.00120
Filter	0.14370	0.14370
CONDENSIBLE PM		
Organic CPM	0.04170	0.04170
Inorganic CPM	0.01730	0.01290
TOTAL CPM	0.05900	0.05460
TOTAL PM	0.20390	0.19950

ANALYTICAL DATA:

METHOD 5 COMPONENTS	TARE (grams)	FINAL (grams)	NET (grams)	VOLUME (ml)
Acetone Probe Wash	67.28100	67.28220	0.00120	80.0
Acetone Blank Residue	64.95670	64.95560	0.00000	80.0
Applicable Acetone Blank			0.00000	
Max. Allowable Blank			0.00063	
Filter	0.38410	0.52780	0.14370	

METHOD 202 COMPONENTS	TARE (grams)	FINAL (grams)	NET (grams)	REAGENT VOLUME (ml)	CONC. (mg/l)
Volume of Cont.#4				550.0	
Organic CPM (Uncorr.)	129.05580	129.09750	0.04170	250.0	
MeCl2 Blank	134.35890	134.35890	0.00000	125.0	
Inorganic CPM (Uncorr.)	194.93360	194.95090	0.01730	550.0	
H2O Blank	132.33750	132.33950	0.00200	250.0	
Inorganic CPM (Corr.)			0.01730		

PARTICULATE EMISSIONS:

	FILTERABLE	CPM	TOTAL
Actual Grain Loading (gr/dscf)	0.0565	0.0213	0.0778
Corrected to 7% O2 (gr/dscf)	0.2309	0.0870	0.3179
Corrected to 12% CO2 (gr/dscf)	0.2259	0.0851	0.3111
Mass Rate (lb/hr)	15.21	5.73	20.94

LOUISIANA PACIFIC
SCRUBBER OUTLET
MULTIPLE METALS ANALYTICAL DATA AND RESULTS

SAMPLING DATA:

Run Number:	SO-M5-R2	
Corr. Sample Volume:	39.582	dscf
Corr. Flowrate	31407	dscfm
O2 Content:	17.5	%
CO2 Content:	3	%

TRACE METALS ANALYTICAL DATA AND RESULTS:

		LABORATORY DATA			METALS EMISSIONS			
					CONCENTRATION			MASS
COMPONENT		Sample (µg)	Blank (µg)	Total (µg)	ACTUAL ug/dscm	@ 12% CO2 ug/dscm	@7% O2 ug/dscm	RATE lb/hr
Calcium	Ca	696.00	0.00	696.00	620.959	2483.838	2538.628	7.31E-02
Iron	Pb	186.00	13.80	172.20	153.634	614.536	628.092	1.81E-02
Manganese	Mn	159.00	0.90	158.10	141.054	564.217	576.663	1.66E-02
Phosphorus	P	< 300.00	0.00	< 300.00	< 267.655	< 1070.620	< 1094.236	< 3.15E-02
Potassium	K	19860.00	0.00	19860.00	17718.757	70875.028	72438.448	2.08E+00
Sodium	Na	4380.00	219.00	4161.00	3712.374	14849.496	15177.058	4.37E-01
Sulfur	S	4800.00	240.00	4560.00	4068.355	16273.420	16632.393	4.79E-01

NOTE: All metal components were blank corrected in accordance with draft EPA Method 29.

RUN NUMBER	SO-M5-R3	
Date	03/08/95	
Start Time	18:45	
End Time	19:55	
Stack Diam.	48	inches
Nozzle I.D.	0.216	inches
Meter Box Gamma	0.9993	
Meter Box dH@	1.7269	
Barometric	28.20	in.Hg
Cp	0.84	
Test Duration	60	minutes

METHOD 4 DATA

	INIT. (ml)	FINAL (ml)	NET (ml)
IMP.1	371.4	577.6	206.2
IMP.2	314.5	333.8	19.3
IMP.3	0.0	2.0	2.0
IMP.4			0.0
IMP.5			0.0
IMP.6			0.0
IMP.7			0.0
TOTAL	685.9	913.4	227.5
S.G.	200.0	209.8	9.8

METHOD 1-4 RESULTS

Metered Volume	38.317	dcf
Volume @ Std.Cond.	35.498	dscf
% Water	23.94	%
% Isokinetics	95.6	%
Velocity	66.58	ft/sec
Actual Flow	50200	acfm
Std. Flow	40219	scfm
Dry Std. Flow	30592	dscfm

METHOD 3 DATA

%O2	17.9	Md	29.13
%CO2	2.6	Ms	26.47
%CO	0.0	Ps	27.99
%N2	79.5	Fo	1.154
O2+CO2	20.5	%EA	580

POINT	STACK TEMP (DegF)	STATIC (in.WC)	DP (in.WC)	DH (in.WC)	METER VOLUME (dcf)	METER TEMPERATURE INLET (DegF)	METER TEMPERATURE OUTLET (DegF)
1	148	-2.80	0.70	0.82	56.274	74	73
2	154	-2.80	0.70	0.82	94.591	77	74
3	158		0.71	0.83		78	75
4	158		0.78	0.91		79	74
5	159		0.98	1.15		79	75
6	159		1.45	1.70		80	75
7	160		1.25	1.50		81	75
8	160		1.30	1.52		82	75
9	158		1.10	1.30		82	75
10	158		1.10	1.30		82	76
11	154		0.75	0.88		80	77
12	158		0.90	1.05		81	76
13	158		1.30	1.52		83	77
14	158		1.15	1.35		83	76
15	156		1.35	1.58		84	77
16	155		1.35	1.58		83	77
17	155		1.10	1.30		83	77
18	154		1.10	1.30		83	76
19	156		0.93	1.08		82	76
20	156		0.93	1.08		83	77
					94.591		
AVG.	157	-2.80	1.05	1.23	38.317		78

LOUISIANA PACIFIC
SCRUBBER OUTLET
EPA METHOD 5/202 ANALYTICAL DATA AND RESULTS

SAMPLING DATA:

Run Number:	**SO-M5-R3**	
Corr. Sample Volume:	35.498	dscf
Corr. Flowrate	30592	dscfm
O2 Content:	17.9	%
CO2 Content:	2.6	%

SUMMARY:

COMPONENT	NET (grams)	CORRECTED FOR BLANK (grams)
SUSPENDED PM		
Probe Wash	0.00120	0.00120
Filter	0.11880	0.11880
CONDENSIBLE PM		
Organic CPM	0.02360	0.02360
Inorganic CPM	0.00900	0.00526
TOTAL CPM	0.03260	0.02886
TOTAL PM	0.15260	0.14886

ANALYTICAL DATA:

METHOD 5 COMPONENTS	TARE (grams)	FINAL (grams)	NET (grams)	VOLUME (ml)
Acetone Probe Wash	64.08980	64.09100	0.00120	120.0
Acetone Blank Residue	64.95670	64.95560	0.00000	80.0
Applicable Acetone Blank			0.00000	
Max. Allowable Blank			0.00094	
Filter	0.36300	0.48180	0.11880	

METHOD 202 COMPONENTS	TARE (grams)	FINAL (grams)	NET (grams)	REAGENT VOLUME (ml)	CONC. (mg/l)
Volume of Cont.#4				468.0	
Organic CPM (Uncorr.)	132.30310	132.32670	0.02360	250.0	
MeCl2 Blank	134.35890	134.35890	0.00000	125.0	
Inorganic CPM (Uncorr.)	199.77580	199.78480	0.00900	468.0	
H2O Blank	132.33750	132.33950	0.00200	250.0	
Inorganic CPM (Corr.)			0.00900		

PARTICULATE EMISSIONS:

	FILTERABLE	CPM	TOTAL
Actual Grain Loading (gr/dscf)	0.0522	0.0125	0.0647
Corrected to 7% O2 (gr/dscf)	0.2417	0.0581	0.2998
Corrected to 12% CO2 (gr/dscf)	0.2407	0.0579	0.2986
Mass Rate (lb/hr)	13.68	3.29	16.97

LOUISIANA PACIFIC
SCRUBBER OUTLET
MULTIPLE METALS ANALYTICAL DATA AND RESULTS

SAMPLING DATA:

Run Number:	SO-M5-R3	
Corr. Sample Volume:	35.498	dscf
Corr. Flowrate	30592	dscfm
O2 Content:	17.9	%
CO2 Content:	2.6	%

TRACE METALS ANALYTICAL DATA AND RESULTS:

		LABORATORY DATA			METALS EMISSIONS			
					CONCENTRATION			MASS RATE
COMPONENT		Sample (µg)	Blank (µg)	Total (µg)	ACTUAL ug/dscm	@ 12% CO2 ug/dscm	@7% O2 ug/dscm	lb/hr
Calcium	Ca	486.00	0.00	486.00	483.492	2231.504	2240.182	5.54E-02
Iron	Pb	171.00	13.80	157.20	156.389	721.795	724.602	1.79E-02
Manganese	Mn	168.00	0.90	167.10	166.238	767.252	770.235	1.90E-02
Phosphorus	P	< 300.00	0.00	< 300.00	< 298.452	< 1377.471	< 1382.828	< 3.42E-02
Potassium	K	20280.00	0.00	20280.00	20175.365	93117.069	93479.191	2.31E+00
Sodium	Na	7650.00	382.50	7267.50	7230.003	33369.245	33499.015	8.28E-01
Sulfur	S	4380.00	219.00	4161.00	4139.531	19105.529	19179.828	4.74E-01

NOTE: All metal components were blank corrected in accordance with draft EPA Method 29.

APPENDIX D

CALCULATIONS

EPA METHODS 2-4 CALCULATIONS

1. Metered Gas Sample Volume at Standard Conditions

$$V_{m(std)} = V_m \times \gamma \times \frac{528}{29.92} \times \left[\frac{P_B + \frac{\Delta H}{13.6}}{T_m + 460} \right]$$

2. Gas Volume of Water Vapor Collected in Impinger Liquid

$$V_{WC(std)} = (v_f - v_i) \times 0.04707$$

3. Gas Volume of Water Vapor Collected in Silica Gel

$$V_{wsg(std)} = (w_f - w_i) \times 0.04715$$

4. Moisture Volume Fraction in Flue Gas

$$B_{ws} = \frac{V_{wc(std)} + V_{wsg(std)}}{V_{wc(std)} + V_{wsg(std)} + V_{m(std)}}$$

5. Moisture Volume Percentage in Flue Gas

$$\%H_2O = B_{ws} \times 100$$

6. Absolute Pressure of Flue Gas

$$P_s = P_B + \frac{P_{static}}{13.6}$$

7. Nitrogen Content of Flue Gas

$$\%N_2 = 100 - (\%CO_2 + \%O_2 + \%CO)$$

8. Dry Molecular Weight of Flue Gas

$$M_d = 0.44 \times \%CO_2 + 0.32 \times \%O_2 + 0.28 \times (\%N_2 + \%CO)$$

9. Wet Molecular Weight of Flue Gas

$$M_s = M_d \times (1 - B_{ws}) + 18 \times B_{ws}$$

10. Fuel Factor Based on Flue Gas Composition

$$F_o = \frac{20.9 - \%O_2}{\%CO_2}$$

11. Excess Air of Flue Gas

$$\%EA = \frac{\%O_2 - 0.5\%CO}{0.264\%N_2 - (\%O_2 - 0.5\%CO)} \times 100$$

12. Average Gas Velocity, ft/sec

$$v_s = 85.49 \times C_p \times (\Delta P)^{1/2}{}_{avg} \times \frac{(T_s + 460)^{1/2}}{(P_s \times M_s)^{1/2}}$$

13. Area of Round Duct or Stack

$$A_s = \frac{\pi \times D^2}{4 \times 144} \quad (round\ ducts)$$

14. Area of Rectangular Duct

$$A_s = \frac{L \times W}{144} \quad (rectangular\ ducts)$$

15. Actual Volumetric Flow Rate of Flue Gas

$$Q_a = v_s \times A_s \times 60$$

16. Flow Rate of Flue Gas at Standard Temperature and Pressure

$$Q_s = Q_a \times \left[\frac{P_s \times 528}{(T_s + 460) \times 29.92} \right]$$

17. Dry Flow Rate of Flue Gas at Std. Temperature and Pressure

$$Q_{sd} = Q_s \times (1 - B_{ws})$$

NOMENCLATURE FOR EPA METHODS 2-4

A_s	=	Stack area, ft^2
B_{ws}	=	Moisture volume fraction
C_p	=	Pitot tube coefficient (≈0.84)
D_s	=	Stack diameter, inches
ΔH	=	Average meter orifice pressure, in.W.C.
ΔP	=	Pitot tube differential pressure, in.W.C.
F_o	=	Combustion factor
γ	=	Meter calibration factor, gamma
L	=	Length of rectangular stack or duct, inches
M_D	=	Dry molecular weight, lb/lb-mole
M_s	=	Wet molecular weight, lb/lb-mole
P_B	=	Barometric pressure, in.Hg
P_s	=	Absolute stack pressure, in.Hg
P_{static}	=	Average static pressure, in.W.C.
Q_a	=	Actual gas flow rate, acfm
Q_s	=	Standard gas flow rate, scfm
Q_{sd}	=	Dry standard gas flow rate, dscfm
T_m	=	Average meter temperature, °F
T_s	=	Average stack temperature, °F
v_f	=	Final impinger volume, ml
v_i	=	Initial impinger volume, ml
V_m	=	Uncorrected metered gas volume, dcf
$V_{m(std)}$	=	Corrected gas volume, dscf
v_s	=	Average gas velocity, ft/sec
$V_{wc(std)}$	=	Gas volume of water caught in impingers, scf
$V_{wsg(std)}$	=	Gas volume of water caught in silica gel, scf
W	=	Width of rectangular stack or duct, inches
w_f	=	Final silica gel mass, grams
w_i	=	Initial silica gel mass, grams
$\%O_2$	=	Dry volumetric concentration of O_2, %dv
$\%CO_2$	=	Dry volumetric concentration of CO_2, %dv
%CO	=	Dry volumetric concentration of CO, %dv
$\%N_2$	=	Dry volumetric concentration of N_2, %dv
%EA	=	Percent excess air

EPA METHOD 5 GRAVIMETRIC CALCULATIONS

1. PM Collected in Probe Wash - M_{pw}

$$M_{pw} = (W_{pw})_{final} - (W_{pw})_{tare}$$

2. Applicable Acetone Blank Correction - B_{apw}

$$B_{apw} = \left[(W_{ab})_{final} - (W_{ab})_{tare}\right] \times \frac{V_{pw}}{V_{ab}}$$

3. Maximum Allowable Acetone Blank - B_{amax}

$$B_{amax} = 0.7845 \times 0.00001 \times V_{pw}$$

4. Actual Probe Wash Blank Correction - B_{pw}

$$B_{pw} = MINIMUM\ [B_{apw},\ B_{amax}]$$

5. PM Collected on Filter - M_f

$$M_f = (W_f)_{final} - (W_f)_{tare}$$

6. Total PM Collected for Method 5 Calculations - M_5

$$M_5 = M_{pw} + M_f - B_{pw}$$

NOMENCLATURE

B_{amax}	=	Maximum allowable acetone blank correction, based on weight of acetone in probe wash, grams
B_{apw}	=	Acetone blank correction based on residue of blank, grams
B_{pw}	=	Acetone blank correction actually used, grams
M_5	=	Total mass of particulate in train corrected for acetone blank, grams
M_f	=	Mass gain of filter, grams
M_{pw}	=	Probe wash residue, grams
V_{ab}	=	Liquid volume of acetone blank, ml
V_{pw}	=	Liquid volume of probe wash, ml
$(W_{ab})_{final}$	=	Final weight of beaker containing acetone blank residue, grams
$(W_{ab})_{tare}$	=	Tare weight of beaker containing acetone blank residue, grams
$(W_f)_{final}$	=	Final weight of filter, grams
$(W_f)_{tare}$	=	Tare weight of filter, grams
$(W_{pw})_{final}$	=	Final weight of beaker containing probe wash residue, grams
$(W_{pw})_{tare}$	=	Tare weight of beaker containing probe wash residue, grams

PARTICULATE EMISSIONS CALCULATIONS

1. Particulate Concentration - C_{sd}

$$C_{sd} = \frac{\Sigma(M_i)}{V_{m(std)}} \times \frac{7000}{453.593}$$

2. Particulate Concentration Corrected to 7% O_2 - $C_{sd}@7\%O_2$

$$C_{sd@7\%} = C_{sd} \times \frac{20.9 - 7.0}{20.9 - \%O_2}$$

3. Particulate Concentration Corrected to 12% CO_2 - $C_{sd}@12\%CO_2$

$$C_{sd@12\%} = C_{sd} \times \frac{12}{\%CO_2}$$

4. Particulate Concentration Corrected to 50% Excess Air - $C_{sd}@50\%EA$

$$C_{sd@50\%EA} = C_{sd} \times \frac{100 + \%EA}{150}$$

5. Particulate Mass Rate - M_p

$$M_p = \frac{\Sigma(M_i)}{V_{m(std)}} \times Q_{sd} \times \frac{60}{453.593}$$

6. Isokinetic Variation - %ISO

$$\%Iso = \frac{0.09450 \times (T_s + 460) \times V_{m(std)}}{P_s \times v_s \times A_n \times time \times (1 - B_{ws})}$$

NOMENCLATURE

A_n	=	Nozzle area, ft^2
C_{sd}	=	Particulate concentration, grains/dscf
D_n	=	Nozzle diameter, inches
ΣM_i	=	Summation of PM collected in sample train, grams
M_p	=	Mass rate of particulate emissions, lb/hr
P_s	=	Absolute stack pressure, in.Hg
Q_{sd}	=	Dry standard gas flow rate, dscfm
time	=	Net sampling time, minutes
T_s	=	Average stack temperature, °F
$V_{m(std)}$	=	Corrected gas volume, dscf
v_s	=	Average gas velocity, ft/sec
$\%O_2$	=	Dry volumetric concentration of O_2, %dv
$\%CO_2$	=	Dry volumetric concentration of CO_2, %dv
%EA	=	Percent excess air
%Iso	=	Percent isokinetics

METHOD 202 CALCULATIONS

1. Calculated correction factor

$$m_c = K\, C_{SO_4^{-2}}\, V_{ic}$$

where,

K = 0.0205 when correcting for NH_{4+} and H_2O
= 0.1840 when correcting for NH_{4+} only

2. Weight of total corrected inorganic CPM (mg)

$$m_i = m_r \left(\frac{V_{ic}}{V_{ic} - V_b} \right) - m_c - m_{Cl^-}$$

3. Corrected concentration of CPM (mg/dscm, mg/dscf)

$$C_{cpm} = \frac{m_o + m_i - m_b}{V_{m(std)}}$$

4. CPM emission rate (kg/hr, lb/hr)

$$ER_{cpm} = K\, C_{cpm}\, Q$$

where K = 6.0E-5 (kg min)/(mg hr) for metric units
= 1.32E-4 (lb min)/(mg hr) for English units

5. Calculation of sulfate ion concentration using NH_3 titration

$$C_{SO_4^{-2}} = \frac{48.03\, V_t\, N}{100}$$

NOMENCLATURE

C_{CPM} = concentration of CPM in flue gas (mg/dscm, mg/ dscf)
C_{SO4} = concentration of SO_4^{-2} in sample (mg/ml)
m_c = mass of NH_{4+} added to sample to form $(NH_4)_2SO_4$ (mg)
m_{Cl} = correction factor for chloride
m_b = weight of CPM in $MeCl_2$ and H_2O blanks (mg)
m_i = weight of inorganic CPM (mg)
m_o = weight of organic CPM (mg)
m_r = weight of dried inorganic fraction (mg)
N = normality of NH_4OH (mg/ml)
Q = volumetric flow rate (dscmm, dscfm)
V_b = volume of sample taken for IC analysis (ml)
V_{ic} = volume of impinger contents sample (ml)
$V_{m(std)}$ = volume of gas sampled, corrected to standard conditions (dscm, dscf)
V_t = volume of NH_4OH titrant

METALS CALCULATIONS

1. Total sample weight - W_i (micrograms)*

$$W_i = m_{front} - mb_{front}$$

2. Gas Concentration - Cm_i (micrograms/dscm)

$$C_{m_i} = \frac{W_i \times 35.3145}{Vmstd}$$

3. Concentration corrected to 7% O_2, C_{i7}

$$C_{i_7} = C_i \times \frac{13.9}{20.9 - \%O_2}$$

4. Concentration corrected to 12% CO_2, C_{i12}

$$C_{i_{12}} = C_i \times \frac{12}{\%CO_2}$$

5. The mass flow rate of substance (i), G_i (lb/hr),

$$G_i = \frac{W_i \times Q_{sd} \times 60}{V_{mstd} \times 10^6 \times 453.593}$$

NOMENCLATURE FOR METALS CALCULATIONS

m_{front}	= total sample weight collected in front half of sample train (micrograms)
mb_{front}	= front half blank correction (micrograms)
Q_{sd}	= stack gas flow rate (dscfm)
Vmstd	= the volume of gas sampled at STP (dscf)
W_i	= total sample weight of (i) (micrograms)
$\%O_2$	= oxygen content in stack gas, dry %
$\%CO_2$	= carbon dioxide content in stack gas, dry %
60	= min/hr
10^6	= micrograms per gram
365	= 365 days per year
35.3145	= cubic feet per cubic meter
453.593	= grams/lb

***BLANK CORRECTION RULES**

FOR ALL METALS EXCEPT MERCURY:

If the measured blank value for the front half (mfhb) is in the range of 0.0 to A μg (A = 1.4 x Filter Area), then mfhb may be used to correct the front half sample (mfh). If mfhb exceeds A μg, then the greater of the following may be used: (1) A μg, or (2) the lesser of (a) mfbh, or (b) 5 percent of mfh.

APPENDIX E

RAW FIELD DATA FOR EPA METHOD 5/202 AND MULTIPLE METALS TESTING

- SCRUBBER INLET -

FIELD DATA SHEET FOR ISOKINETIC SAMPLING

FACILITY LA Pacific TEST LOCATION Dungannon DATE 3/8/95

START TIME 9:25 POLLUTANT TSP / MM / BH RUN I.D. 5I -M5 -01

Point	Sample Time	Clock Time	Static	Stack Temp.	Stack dP	Meter dH	Meter Volume cu.ft.	Meter Temp Inlet	Meter Temp Outlet	Filter Temp.	Imp. Temp.	Meter Vac.
A1	9:25	2.5	-11.0	190	1.5	1.3	718.887	90	91	234	55	7
2		5		200	1.6	1.35	720.5	87	90	238	56	7
3		7.5		200	1.7	1.45	722.2	87	90	240	56	8
4		10		200	1.7	1.45	724.5	88	90	248	56	10
5		12.5		200	1.7	1.45	726.9	88	90	248	57	11
6		15		200	1.8	1.5	727.8	89	89	248	57	11
7		17.5		200	1.7	1.45	728.8	89	89	249	58	11
8		20		197	1.6	1.35	730.5	89	90	245	58	11
9		22.5		195	1.6	1.35	732.1	90	90	240	58	11
10		25		193	1.6	1.35	733.8	90	91	235	57	11
11		27.5		193	1.5	1.3	735.4	90	91	234	57	12
12	9:55	30		190	1.5	1.3	737.2	90	90	248	56	12
B1	10:08	2.5	-11.2	180	1.4	1.2	738.600	87	89	244	55	11
2		5		182	1.5	1.3	740.2	88	89	245	55	11
3		7.5		184	1.5	1.3	741.0	89	89	239	56	11
4		10		186	1.6	1.35	743.7	89	89	236	56	11
5		12.5		187	1.6	1.35	745.3	89	90	235	57	11
6		15		188	1.5	1.3	746.9	90	90	240	57	11
7		17.5		189	1.4	1.2	748.5	90	88	244	58	11
8		20		190	1.5	1.3	750.1	90	88	244	58	11
9		22.5		190	1.6	1.35	751.7	90	88	240	58	11
10		25		189	1.6	1.35	753.4	90	88	235	58	11
11		27.5		189	1.5	1.3	755.0	90	87	233	59	12
12		30		188	1.4	1.2	756.7	90	87	239	59	10
End	10:38						758.295					10

CHAIN OF CUSTODY INFORMATION

Container Number	Sample I.D.	Description
1	456	Filter
2	457	FH Acetone
3	458	Impinger 1
4	459	Impinger 2&3
5	460	FH Nitric
6	461	BH MeCl
7	462	Silica Gel

LEAK CHECK

Vacuum	15"	13			
Rate	.004	.004			

K = 0.852

IMPINGER VOLUMES

	Initial	Final
#1	305.9g	528.3
#2	320.4g	359.8
#3	0g	—
#4	200g	219.0
#5		
#6		

NOZZLE SIZE	5/16" = .188
METER BOX I.D.	12
GAMMA	.9885
DELTA He	1.8053
BAR. PRESS.	28.2
FILTER I.D.	1/18/95-45
OPERATOR	CHP/LH

FIELD DATA SHEET FOR ISOKINETIC SAMPLING

PAGE

FACILITY LA Pacific TEST LOCATION Dungarvan DATE 3/8/95

START TIME 12:15 POLLUTANT TSP/MM/BH RUN I.D. SI-M5-02

Point	Sample Time	Clock Time	Static	Stack Temp.	Stack dP	Meter dH	Meter Volume cu.ft.	Meter Temp Inlet	Meter Temp Outlet	Filter Temp.	Imp. Temp.	Meter Vac.
A.1	12:15	0		184	[illegible]	[illegible]	752.467	88	83	234	50	4
2		2.5	-1.0	186	1.2	1.0	760.2	81	83	237	51	6
3		5		186	1.3	1.1	761.8	84	83	238	51	5
4		7.5		186	1.3	1.1	763.2	84	83	234	51	6
5		10		186	1.3	1.1	764.8	85	83	235	52	6
6		12.5		185	1.4	1.2	766.3	86	84	237	52	6
7		15		185	1.4	1.2	767.8	86	84	236	52	6
8		17.5		184	1.4	1.2	769.4	87	84	241	53	6
9		20		183	1.3	1.1	771.0	84	84	243	53	6
10		22.5		182	1.3	1.1	772.3	88	84	245	53	6
11		25		182	1.2	1.0	773.8	87	85	251	53	6
12		27.5		182	1.2	1.0	775.3	87	85	253	54	6
B1		30/0		176	1.5	1.3	777.854	86	87	265	55	7
2		2.5		176	1.5	1.3	779.4	87	88	258	55	8
3		5		175	1.5	1.3	781.0	87	88	245	56	9
4		7.5		178	1.4	1.2	782.6	87	88	239	56	9
5		10		171	1.3	1.1	784.1	87	89	235	56	9
6		12.5		176	1.5	1.3	785.8	89	89	240	56	11
7		15		172	1.6	1.35	787.5	89	87	252	57	12
8		17.5		173	1.7	1.45	789.3	89	87	252	57	13
9		20		173	1.7	1.45	791.1	89	87	243	57	13
10		22.5		181	1.7	1.45	792.9	88	87	237	57	14
11		25		184	1.6	1.35	794.6	88	87	235	58	14
12		27.5		186	1.6	1.35	796.3	87	87	239	58	14
End		30					797.914					

CHAIN OF CUSTODY INFORMATION

Container Number	Sample I.D.	Description
1	464	Filter
2	465	FH Acetone
3	466	Impinger 1
4	467	Impinger 2+3
5	468	FH Nitric
6	469	pH meCl
7	470	Silgel

LEAK CHECK Initial

Vacuum	15"	15"			
Rate	.008	.009			

K = ~~0.852~~

IMPINGER VOLUMES

	Initial	Final
#1	372.1g	532.8g
#2	320.5g	336.9g
#3	0g	—
#4	200g	212.9g
#5		
#6		

NOZZLE SIZE	3/16 = .188
METER BOX I.D.	12
GAMMA	.9885
DELTA H@	1.8053
BAR. PRESS.	28.2
FILTER I.D.	1/18/95-46
OPERATOR	CHP/LH

FIELD DATA SHEET FOR ISOKINETIC SAMPLING

FACILITY LA Pacific TEST LOCATION Dungannon DATE 3/8/95

START TIME 18:45 POLLUTANT TSP/MM/BH RUN I.D. SI -M5 -R3

Point	Sample Time	Clock Time	Static	Stack Temp.	Stack dP	Meter dH	Meter Volume cu.ft.	Meter Temp Inlet	Meter Temp Outlet	Filter Temp.	Imp. Temp.	Meter Vac.
A1	0	18:45		175	1.4	1.2	391.387	88	82	253	50	8
2	2.5			173	1.4	1.2	392.5	87	81	251	49	8
3	5		-11.1	172	1.5	1.3	393.7	86	80	233	49	9
4	7.5			171	1.5	1.2	395.0	86	79	234	50	9
5	10			170	1.6	1.35	396.6	87	79	235	50	10
6	12.5			170	1.6	1.35	398.1	88	80	245	51	10
7	15			170	1.7	1.45	399.7	89	81	250	51	11
8	17.5			171	1.7	1.45	401.3	90	82	241	51	12
9	20			173	1.8	1.5	403.0	90	82	235	51	13
10	22.5			173	1.7	1.45	404.8	91	83	233	52	13
11	25			174	1.7	1.45	406.5	92	84	238	52	13
12	27.5			169	1.6	1.35	408.3	93	85	248	52	13
B1	30/0	19:15		168	1.2	1.0	409.612	92	88	236	52	11
2	2.5	19:24		168	1.2	1.0	411.2	93	89	241	52	11
3	5		-11.0	171	1.3	1.1	412.8	94	90	249	53	12
4	7.5			170	1.3	1.1	414.4	94	90	248	52	12
5	10			169	1.3	1.1	415.7	95	91	239	53	13
6	12.5			168	1.4	1.2	417.3	95	92	234	54	14
7	15			165	1.4	1.2	418.5	96	92	230	54	14
8	17.5			166	1.4	1.2	419.7	95	92	247	54	14
9	20			165	1.3	1.1	420.9	96	92	256	55	14
10	22.5			167	1.3	1.1	422.1	96	93	258	55	14
11	25			170	1.2	1.0	423.3	95	92	235	56	13
12	27.5			171	1.2	1.0	424.4	95	92	233	56	13
End	30	19:34					425.748					

CHAIN OF CUSTODY INFORMATION

Container Number	Sample I.D.	Description
1	472	Filter
2	473	FH Acetone
3	474	Impinger 1
4	475	Impr 2+3
5	476	FH Nitric
6	477	BH MeCl
7	478	silicagel

LEAK CHECK Initial

Vacuum	15"	18"			
Rate	.004	.004			

IMPINGER VOLUMES

	Initial	Final
#1	370.8	545.3g
#2	318.7	336.0g
#3	0g	—
#4	200	211.6g
#5		
#6		

NOZZLE SIZE	5/16
METER BOX I.D.	12
GAMMA	.9895
DELTA H@	1.8053
BAR. PRESS.	28.2
FILTER I.D.	1/18/95 - 47
OPERATOR	CHP/LH

INTEGRATED BAG ANALYSIS FOR %O2 AND %CO2
INSTRUMENT ANALYZER METHOD 3A

SOURCE: Scrubber Inlet		LOCATION: LA Pacific	
RUN I.D.: SI-M3-R1		ETS CONT. NO.: 95-403	
PROCESS/FUEL TYPE: wood		TECHNICIAN: KAB	
%O2	17.5	%CO2	3.0
%O2	17.5	%CO2	3.0
%O2	17.4	%CO2	2.9
AVERAGE	17.5	AVERAGE	3.0
		Fo FACTOR:	1.133

RUN I.D.:	SI-M3-R2	TECHNICIAN:	KAB
%O2	17.7	%CO2	2.9
%O2	17.7	%CO2	3.0
%O2	17.7	%CO2	2.9
AVERAGE	17.7	AVERAGE	2.9
		Fo FACTOR:	1.034

RUN I.D.:	SI-M3-R3	TECHNICIAN:	KAB
%O2	17.8	%CO2	2.7
%O2	17.9	%CO2	2.8
%O2	17.9	%CO2	2.8
AVERAGE	17.9	AVERAGE	2.8
		Fo FACTOR:	1.0714

Fo = (20.9 - %O2)/%CO2

COMMON Fo FACTORS:

Gas, Natural	(1.600-1.836)	Coal, Bituminous	(1.083-1.230)
Gas, Propane	(1.434-1.586)	Coal, Anthracite	(1.016-1.130)
Wood	(1.000-1.120)	Oil, Distillate	(1.260-1.413)
		Oil, Residual	(1.210-1.370)

APPENDIX F

RAW FIELD DATA FOR EPA METHOD 5/202 AND MULTIPLE METALS TESTING

- SCRUBBER OUTLET -

FACILITY L.A. Pacific TEST LOCATION Scrubber Outlet DATE 3/8/95

START TIME 9:25 POLLUTANT Part./MATL/SH RUN I.D. SO-M5-01

Point	Sample Time	Clock Time	Static	Stack Temp.	Stack dP	Meter dH	Meter Volume cu.ft.	Meter Temp Inlet	Meter Temp Outlet	Filter Temp.	Imp. Temp.	Meter Vac.
B1	9:25	0		150	.64	.75	969.685	76	76	233	48	3.5"
2	9:28	3		154	.69	.81	970.5	77	76	235	49	3.5"
3	9:31	6		154	.77	.9	971.6	78	76	238	52	4.5"
4	9:34	9		156	1.05	1.23	972.3	78	76	242	52	5.0"
5	9:37	12		158	1.3	1.5	973.0	81	76	240	52	6.0"
6	9:40	15	-2.7	157	1.6	1.9	974.01	82	76	244	53	7.5"
7	9:43	18		158	1.45	1.7	976.98	82	76	246	53	8"
8	9:46	21		159	1.6	1.82	978.2	82	76	243	53	8"
9	9:49	24		159	1.4	1.64	980.60	83	76	243	53	7.5"
10	9:52	27		158	1.3	1.52	982.0	88	76	245	53	7"
A-1	9:55 / 10:08	30/0		154	1.5	1.75	985.025 / 986.863	77	75	240	55	8"
2	10:11	3		155	1.45	1.7	989.8	74	75	242	53	7.5"
3		6		158	1.0	1.17	991.9	74	75	245	54	6"
4		9		157	1.25	1.5	994.5	75	75	245	54	7"
5		12		155	1.25	1.5	997.1	76	75	247	55	7"
6		15	-2.7	156	1.5	1.75	900.1	77	76	245	56	8"
7		18		153	1.5	1.75	903.1	78	76	243	56	8"
8		21		154	1.2	1.4	905.3	79	76	241	56	7"
9		24		154	.98	1.15	907.3	80	76	243	57	6.5"
10		27		154	1.01	1.63	909.6	81	76	242	57	7"
End	10:38	30					911.533					

CHAIN OF CUSTODY INFORMATION

Container Number	Sample I.D.	Description
1	448	Filter
2	449	FH Acetone
3	450	Imp. 1
4	451	Imp. 2&3
5	452	FH Nitric
6	453	BH $MeCl_2$
7	454	S.G.

LEAK CHECK

Vacuum	15"				
Rate	.001				

k = 1.17

IMPINGER ~~VOLUMES~~ WEIGHTS

	Initial	Final
#1	408.0	582.4
#2	310.7	374.1
#3	—	—
#4	200.0	210.6
#5		
#6		

NOZZLE SIZE	.22
METER BOX I.D.	6
GAMMA	.9993
DELTA He	1.7269
BAR. PRESS.	
FILTER I.D.	43
OPERATOR	C.S./KBB

1/18/95

FACILITY L.A. Pacific TEST LOCATION Scrubber/outlet DATE 3/8/95

START TIME 12:15 POLLUTANT Part/M, MTC/B.M RUN I.D. 50 -M 5 -R 2

Point	Sample Time	Clock Time	Static	Stack Temp.	Stack dP	Meter dH	Meter Volume cu.ft.	Meter Temp Inlet	Meter Temp Outlet	Filter Temp.	Imp. Temp.	Meter Vac.
B1	12:15	0		147	.59	.76	012.742	75	74	243	46	3.5"
2		3		147	.7	.82	014.4	76	74	251	48	3.5"
3		6		154	.75	.88	016.0	78	74	254	49	3.5"
4		9		157	1.0	1.17	017.8	78	74	253	49	5"
5		12		156	1.25	1.05	019.8	80	74	253	50	6.5"
6		15	-2.8	157	1.6	1.9	022.2	81	75	249	50	7.5"
7		18		158	1.5	1.8	024.3	82	75	247	50	8"
8		21		159	1.7	2.0	026.4	83	75	244	50	8"
9		24		158	1.5	1.8	028.9	84	75	244	51	7"
10		27		159	1.3	1.52	031.1	84	75	242	50	7"
A1	12:45 / 12:55	30/0		1054	1.5	1.8	033.340	77	74	241	54	6"
2	16:05	3		154	.99	1.15	037.2	73	71	244	51	6"
3		6		158	1.2	1.4	039.4	74	72	243	51	7"
4		9		158	1.25	1.5	040.9	76	73	241	51	8"
5		12		155	1.5	1.8	043.0	77	73	245	52	9"
6		15	-2.6	155	1.6	1.9	045.3	79	73	251	52	8.5"
7		18		153	1.4	1.6	047.7	80	73	248	52	7.5"
8		21		153	1.15	1.35	050.1	81	74	246	52	7.5"
9		24		154	.98	1.15	052.0	82	74	244	52	8"
10		27		154	1.1	1.3	054.2	81	74	242	53	8"
End	16:32	30					056.125					

← 033.340 / 034.171

(stopped test from 12:57:30 to 16:05:00 due fuel (wood) shortage for process

CHAIN OF CUSTODY INFORMATION

Container Number	Sample I.D.	Description
1	408	Filter
2	409	FH ACEtone
3	410	Impinger 1
4	411	Impinger 2+3
5	412	FH NHTric
6	413	BH MECl
7	414	Silgel

LEAK CHECK

Vacuum	15"	15"			
Rate	.002	.001			

K = 1.17

IMPINGER ~~VOLUMES~~ WEIGHTS

	Initial	Final
#1	373.6	696.9
#2	311.8	315.8
#3	—	
#4	200.0	210.0
#5		
#6		

NOZZLE SIZE	0.22
METER BOX I.D.	6
GAMMA	0.9993
DELTA H@	1.7269
BAR. PRESS.	
FILTER I.D.	41
OPERATOR	KAB/CS

1-18-95

FACILITY L.A. Pacific TEST LOCATION Scrubber outlet DATE 3/8/95

START TIME 18:45 POLLUTANT Part./MMTL/D.A. RUN I.D. 50 -M 5 -D 3

Point	Sample Time	Clock Time	Static	Stack Temp.	Stack dP	Meter dH	Meter Volume cu.ft.	Meter Temp Inlet	Meter Temp Outlet	Filter Temp.	Imp. Temp.	Meter Vac.
D-1	18:45	0	-2.8	148	0.7	.82	056.274	74	73	229	45	4.5"
2		3		154	0.7	.82	057.9	77	74	229	45	4.5"
3		6		158	0.71	.83	059.6	78	75	232	46	4.5"
4		9		158	0.78	.91	061.3	79	74	237	45	5"
5		12		159	.98	1.15	063.2	79	75	237	46	6"
6		15		159	1.45	1.7	064.6	80	75	238	47	~~[illegible]~~ 8.5"
7		18		160	1.25	1.5	066.7	81	75	239	47	8"
8		21		160	1.3	1.52	069.0	82	75	240	47	8.5"
9		24		158	1.1	1.3	071.0	82	75	242	48	8"
10		27		158	1.1	1.3	073.0	82	76	242	48	8"
A-1	19:15 19:25	30/0		154	0.75	.88	074.964	80	77	268	53	8"
2		3	-2.8	158	.9	1.05	076.7	81	76	273	51	10"
3		6		158	1.3	1.52	078.4	83	77	266	52	14"
4		9		158	1.15	1.35	080.7	83	76	257	52	12"
5		12		156	1.35	1.58	083.0	84	77	253	53	14"
6		15		155	1.35	1.58	085.1	83	77	249	54	14.5"
7		18		155	1.1	1.3	087.0	83	77	245	54	12.5"
8		21		154	1.1	1.3	089.0	83	76	244	54	12.5
9		24		156	.93	1.08	091.0	82	76	249	56	10.5"
10		27		156	.93	1.08	092.8	83	77	248	57	11"
End	19:55	30			~~.92~~	~~[illegible]~~	094.591					

CHAIN OF CUSTODY INFORMATION

Container Number	Sample I.D.	Description
1	416	Filter
2	417	FH Acetone
3	418	Impinger 1
4	419	Impinger 2+3
5	420	FH Nitric
6	421	BH MeCl
7	427	Silgel

LEAK CHECK

Vacuum	15"	15"			
Rate	.004	.001			

K = 1.17

IMPINGER ~~VOLUMES~~ WEIGHTS

	Initial	Final
#1	371.4	577.6
#2	314.5	333.8
#3	—	—
#4	200.0	209.8
#5		
#6		

NOZZLE SIZE	.22
METER BOX I.D.	6
GAMMA	.9993
DELTA H@	1.7269
BAR. PRESS.	
FILTER I.D.	42
OPERATOR	C.S./KBB

1/18/95

Pitot # 103

INTEGRATED BAG ANALYSIS FOR %O2 AND %CO2
INSTRUMENT ANALYZER METHOD 3A

SOURCE: Scrubber Outlet		LOCATION: LA Pacific	
RUN I.D.: R1/M3A/out		ETS CONT. NO.: 95-403	
PROCESS/FUEL TYPE: Wood		TECHNICIAN: KBB	
%O2	17.3	%CO2	3.1
%O2	17.2	%CO2	3.2
%O2	17.3	%CO2	3.2
AVERAGE	17.3	AVERAGE	3.2
		Fo FACTOR:	1.125

RUN I.D.: ~~[illegible]~~ 50-M3-R2		TECHNICIAN: KBB	
%O2	17.5	%CO2	3.0
%O2	17.5	%CO2	3.0
%O2	17.5	%CO2	3.0
AVERAGE	17.5	AVERAGE	3.0
		Fo FACTOR:	1.133

RUN I.D.: 50-M3-R3		TECHNICIAN: KBB	
%O2	17.9	%CO2	2.6
%O2	17.9	%CO2	2.6
%O2	17.8	%CO2	2.6
AVERAGE	17.9	AVERAGE	2.6
		Fo FACTOR:	1.1538

Fo = (20.9 - %O2)/%CO2

COMMON Fo FACTORS:

Gas, Natural	(1.600-1.836)	Coal, Bituminous	(1.083-1.230)
Gas, Propane	(1.434-1.586)	Coal, Anthracite	(1.016-1.130)
Wood	(1.000-1.120)	Oil, Distillate	(1.260-1.413)
		Oil, Residual	(1.210-1.370)

APPENDIX G

GRAVIMETRICS LABORATORY DATA

E T S , I N C .

F I E L D S A M P L E L O G

Contract No. 95-403
Job I.D.
Test Method 5/202

Print Date 03/13/95 Time 15:46:48
Page 1

Sample No.	Container No.	Other I.D.	Run I.D.	Sample Type	Volume,ml no Rinses	Volume,ml w/ Rinses	Analyst	Date	Comments
00408	F1	01/18/95-0041	SO -202-R2	Filter			TGW	03/13/95	
00409	F2		SO -202-R2	FH Acetone Rinse			TGW	03/13/95	
00410	F3		SO -202-R2	Impinger contents			TGW	03/13/95	
00411	F4		SO -202-R2	Imp. Contents extra			TGW	03/13/95	
00412	F5		SO -202-R2	FH HNO3 RINSE			TGW	03/13/95	
00413	F6		SO -202-R2	MECL2 Impinger Rinse			TGW	03/13/95	
00414	F7		SO -202-R2	Silica Gel			TGW	03/13/95	
00415	F8		SO -202-R2	TEDLAR BAG			TGW	03/13/95	
00416	F1	01/18/95-0042	SO -202-R3	Filter			TGW	03/13/95	
00417	F2		SO -202-R3	FH Acetone Rinse			TGW	03/13/95	
00418	F3		SO -202-R3	Impinger contents			TGW	03/13/95	
00419	F4		SO -202-R3	Imp. Contents extra			TGW	03/13/95	
00420	F5		SO -202-R3	FH HNO3 Rinse			TGW	03/13/95	
00421	F6		SO -202-R3	MECL2 Impinger Rinse			TGW	03/13/95	
00422	F7		SO -202-R3	Silica Gel			TGW	03/13/95	
00423	F8		SO -202-R3	TEDLAR BAG			TGW	03/13/95	
00448	F1	01/18/95-0043	SO -202-R1	Filter			TGW	03/13/95	
00449	F2		SO -202-R1	FH Acetone Rinse			TGW	03/13/95	
00450	F3		SO -202-R1	Impinger contents			TGW	03/13/95	
00451	F4		SO -202-R1	Imp. Contents extra			TGW	03/13/95	
00452	F5		SO -202-R1	FH HNO3 Rinse			TGW	03/13/95	
00453	F6		SO -202-R1	MECL2 Impinger Rinse			TGW	03/13/95	
00454	F7		SO -202-R1	Silica Gel			TGW	03/13/95	
00455	F8		SO -202-R1	TEDLAR BAG			TGW	03/13/95	
00456	F1	01/18/95-0045	SI -202-R1	Filter			TGW	03/13/95	
00457	F2		SI -202-R1	FH Acetone Rinse			TGW	03/13/95	
00458	F3		SI -202-R1	Impinger contents			TGW	03/13/95	

E T S , I N C .

F I E L D S A M P L E L O G

Contract No. 95-403
Job I.D.
Test Method 5/202

Print Date 03/13/95

Sample No.	Container No.	Other I.D.	Run I.D.	Sample Type	Volume,ml no Rinses	Volume,ml w/ Rinses	Analyst	Date	Comments
00459	F4		SI -202-R1	Imp. Contents extra			TGW	03/13/95	
00460	F5		SI -202-R1	FH HNO3 Rinse			TGW	03/13/95	
00461	F6		SI -202-R1	MECL2 Impinger Rinse			TGW	03/13/95	
00462	F7		SI -202-R1	Silica Gel			TGW	03/13/95	
00463	F8		SI -202-R1	TEDLAR BAG			TGW	03/13/95	
00464	F1	01/18/95-0046	SI -202-R2	Filter			TGW	03/13/95	
00465	F2		SI -202-R2	FH Acetone Rinse			TGW	03/13/95	
00466	F3		SI -202-R2	Impinger contents			TGW	03/13/95	
00467	F4		SI -202-R2	Imp. Contents extra			TGW	03/13/95	
00468	F5		SI -202-R2	FH HNO3 Rinse			TGW	03/13/95	
00469	F6		SI -202-R2	MECL2 Impinger Rinse			TGW	03/13/95	
00470	F7		SI -202-R2	Silica Gel			TGW	03/13/95	
00471	F8		SI -202-R2	TEDLAR BAG			TGW	03/13/95	
00472	F1	01/18/95-0047	SI -202-R3	Filter			TGW	03/13/95	
00473	F2		SI -202-R3	FH Acetone Rinse			TGW	03/13/95	
00474	F3		SI -202-R3	Impinger contents			TGW	03/13/95	
00475	F4		SI -202-R3	Imp. Contents extra			TGW	03/13/95	
00476	F5		SI -202-R3	FH HNO3 Rinse			TGW	03/13/95	
00477	F6		SI -202-R3	MECL2 Impinger Rinse			TGW	03/13/95	
00478	F7		SI -202-R3	Silica Gel			TGW	03/13/95	
00479	F8		SI -202-R3	TEDLAR BAG			TGW	03/13/95	
00480	F1	01/18/95-0048	BLK -202-R0	Filter			TGW	03/13/95	
00481	F2		BLK -202-R0	FH Acetone Rinse			TGW	03/13/95	
00482	F3		BLK -202-R0	Impinger contents			TGW	03/13/95	
00483	F4		BLK -202-R0	Imp. Contents extra			TGW	03/13/95	
00484	F5		BLK -202-R0	FH HNO3 Rinse			TGW	03/13/95	
00485	F6		BLK -202-R0	MECL2 Impinger Rinse			TGW	03/13/95	

E T S , I N C .

F I E L D S A M P L E L O G

Contract No. 95-403
Job I.D.
Test Method 5/202

Print Date 03/13/95

Sample No.	Container No.	Other I.D.	Run I.D.	Sample Type	Volume,ml no Rinses	Volume,ml w/ Rinses	Analyst	Date	Comments
00486	F7		BLK -202-R0	Silica Gel			TGW	03/13/95	
00487	F8		BLK -202-R0	TEDLAR BAG			TGW	03/13/95	

ETS, Inc.
GRAVIMETRIC LABORATORY DATA
Final Beaker Weights

Job Number: 95-403
Report Prepared on: 03/17/95

Beaker # / Filter # / Sample # / Run I.D. / Total Vol.,ml / Aliquot Vol.	Constant Tare Weight (g) Beaker / Filter	Final Weight Data Date	Time	Weight (g)	Analyst	Constant Final Weight (g)
02/06/95-021	64.30420	03/13/95	17:10	64.83000	TGW	64.83200
Q01/18/95-0041	0.38410	03/14/95	10:48	64.83230	TGW	
95-403-00408		03/14/95	17:58	64.83200	TGW	
SO -202-R2						
02/06/95-022	67.28100	03/13/95	17:07	67.28500	TGW	67.28220
	0.00000	03/14/95	10:44	67.28260	TGW	
95-403-00409		03/14/95	17:58	67.28220	TGW	
SO -202-R2						
80.00000						
80.00000						
12/05/94-046	66.28800	03/14/95	14:29	66.29380	TGW	66.29420
	0.00000	03/15/95	12:48	66.29420	TGW	
95-403-00410						
SO -202-R2						
12/05/94-047	64.19560	03/14/95	14:30	64.20120	TGW	64.20170
	0.00000	03/15/95	12:48	64.20200	TGW	
95-403-00410		03/16/95	16:25	64.20170	TGW	
SO -202-R2						
12/05/94-048	64.45000	03/14/95	14:30	64.45420	TGW	64.45500
	0.00000	03/15/95	12:48	64.45510	TGW	
95-403-00410		03/16/95	16:25	64.45500	TGW	
SO -202-R2						

ETS, Inc.
GRAVIMETRIC LABORATORY DATA
Final Beaker Weights

Job Number: 95-403
Report Prepared on: 03/17/95

Beaker # / Filter # / Sample # / Run I.D. / Total Vol.,ml / Aliquot Vol.	Constant Tare Weight (g) Beaker / Filter	Final Weight Data Date	Time	Weight (g)	Analyst	Constant Final Weight (g)
12/05/94-044	64.15150	03/14/95	14:29	64.18910	TGW	64.19040
	0.00000	03/15/95	12:48	64.19020	TGW	
95-403-00413		03/16/95	16:25	64.19040	TGW	
SO -202-R2						
12/05/94-045	64.90430	03/14/95	14:29	64.90590	TGW	64.90710
	0.00000	03/15/95	12:48	64.90720	TGW	
95-403-00413		03/16/95	16:25	64.90710	TGW	
SO -202-R2						
02/06/95-023	64.71250	03/13/95	17:07	65.18920	TGW	65.19430
Q01/18/95-0042	0.36300	03/14/95	10:45	65.19470	TGW	
95-403-00416		03/14/95	17:59	65.19430	TGW	
SO -202-R3						
02/06/95-024	64.08980	03/13/95	17:07	64.08140	TGW	64.09100
	0.00000	03/14/95	10:45	64.09150	TGW	
95-403-00417		03/14/95	17:59	64.09100	TGW	
SO -202-R3						
120.00000						
120.00000						
09/23/94-047	64.99680	03/14/95	14:31	64.99850	TGW	64.99970
	0.00000	03/15/95	12:49	64.99940	TGW	
95-403-00418		03/16/95	16:26	64.99970	TGW	
SO -202-R3						

ETS, Inc.
GRAVIMETRIC LABORATORY DATA
Final Beaker Weights

Job Number: 95-403
Report Prepared on: 03/17/95

Beaker # / Filter # / Sample # / Run I.D. / Total Vol.,ml / Aliquot Vol.	Constant Tare Weight (g) / Beaker / Filter	Final Weight Data: Date	Time	Weight (g)	Analyst	Constant Final Weight (g)
09/23/94-048	67.96500	03/14/95	14:31	67.96670	TGW	67.96760
	0.00000	03/15/95	12:49	67.96780	TGW	
95-403-00418		03/16/95	16:26	67.96760	TGW	
SO -202-R3						
12/10/94-021	66.81400	03/14/95	14:33	66.81700	TGW	66.81750
	0.00000	03/15/95	12:50	66.81750	TGW	
95-403-00418						
SO -202-R3						
09/23/94-045	64.92480	03/14/95	14:31	64.94790	TGW	64.94840
	0.00000	03/15/95	12:49	64.94860	TGW	
95-403-00421		03/16/95	16:25	64.94840	TGW	
SO -202-R3						
09/23/94-046	67.37830	03/14/95	14:31	67.37740	TGW	67.37830
	0.00000	03/15/95	12:49	67.37820	TGW	
95-403-00421		03/16/95	16:26	67.37830	TGW	
SO -202-R3						
02/06/95-019	70.02450	03/13/95	17:09	70.55960	TGW	70.55110
Q01/18/95-0043	0.36540	03/14/95	10:48	70.55120	TGW	
95-403-00448		03/14/95	17:57	70.55110	TGW	
SO -202-R1						

ETS, Inc.
GRAVIMETRIC LABORATORY DATA
Final Beaker Weights

Job Number: 95-403
Report Prepared on: 03/17/95

Beaker # / Filter # / Sample # / Run I.D. / Total Vol.,ml / Aliquot Vol.	Constant Tare Weight (g) / Beaker / Filter	Final Weight Data: Date	Time	Weight (g)	Analyst	Constant Final Weight (g)
02/06/95-020	64.13070	03/13/95	17:09	64.14060	TGW	64.13230
	0.00000	03/14/95	10:48	64.13280	TGW	
95-403-00449		03/14/95	17:57	64.13230	TGW	
SO -202-R1						
125.00000						
125.00000						
12/10/94-012	64.64170	03/14/95	14:29	64.64180	TGW	64.64330
	0.00000	03/15/95	12:47	64.64280	TGW	
95-403-00450		03/16/95	16:24	64.64330	TGW	
SO -202-R1						
12/10/94-035	67.25510	03/14/95	14:28	67.25430	TGW	67.25480
	0.00000	03/15/95	12:47	67.25480	TGW	
95-403-00450						
SO -202-R1						
12/10/94-036	64.04730	03/14/95	14:28	64.04910	TGW	64.04960
	0.00000	03/15/95	12:47	64.04960	TGW	
95-403-00450						
SO -202-R1						
12/10/94-033	64.49330	03/14/95	14:27	64.49550	TGW	64.49590
	0.00000	03/15/95	12:46	64.49590	TGW	
95-403-00453						
SO -202-R1						

ETS, Inc.
GRAVIMETRIC LABORATORY DATA
Final Beaker Weights

Job Number: 95-403
Report Prepared on: 03/17/95

Beaker # / Filter # / Sample # / Run I.D. / Total Vol.,ml / Aliquot Vol.	Constant Tare Weight (g) Beaker / Filter	Final Weight Data Date	Time	Weight (g)	Analyst	Constant Final Weight (g)
12/10/94-034	67.21400	03/14/95	14:28	67.21290	TGW	67.21340
	0.00000	03/15/95	12:46	67.21340	TGW	
95-403-00453						
SO -202-R1						
02/06/95-013	70.30380	03/13/95	17:08	71.20370	TGW	71.18860
Q01/18/95-0045	0.36510	03/14/95	10:46	71.18810	TGW	
95-403-00456		03/14/95	17:54	71.18860	TGW	
SI -202-R1						
02/06/95-014	67.20330	03/13/95	17:08	67.25220	TGW	67.25860
	0.00000	03/14/95	10:46	67.25900	TGW	
95-403-00457		03/14/95	17:55	67.25860	TGW	
SI -202-R1						
60.00000						
60.00000						
02/09/95-034	67.23150	03/14/95	14:23	67.25930	TGW	67.25860
	0.00000	03/15/95	12:43	67.25840	TGW	
95-403-00458		03/16/95	16:23	67.25860	TGW	
SI -202-R1						
02/09/95-035	66.48670	03/14/95	14:23	66.51450	TGW	66.51380
	0.00000	03/15/95	12:43	66.51340	TGW	
95-403-00458		03/16/95	16:23	66.51380	TGW	
SI -202-R1						

ETS, Inc.
GRAVIMETRIC LABORATORY DATA
Final Beaker Weights

Job Number: 95-403
Report Prepared on: 03/17/95

Beaker # / Filter # / Sample # / Run I.D. / Total Vol.,ml / Aliquot Vol.	Constant Tare Weight (g) Beaker / Filter	Final Weight Data Date	Time	Weight (g)	Analyst	Constant Final Weight (g)
02/09/95-036	64.16990	03/14/95	14:23	64.19130	TGW	64.19030
	0.00000	03/15/95	12:43	64.19010	TGW	
95-403-00458		03/16/95	16:23	64.19030	TGW	
SI -202-R1						
02/09/95-032	63.90130	03/14/95	14:22	63.92480	TGW	63.92340
	0.00000	03/15/95	12:43	63.92290	TGW	
95-403-00461		03/16/95	16:22	63.92340	TGW	
SI -202-R1						
02/09/95-033	67.26540	03/14/95	14:22	67.28030	TGW	67.27900
	0.00000	03/15/95	12:43	67.27850	TGW	
95-403-00461		03/16/95	16:22	67.27900	TGW	
SI -202-R1						
02/06/95-015	69.35680	03/13/95	17:08	69.95680	TGW	69.95260
Q01/18/95-0046	0.36420	03/14/95	10:47	69.95250	TGW	
95-403-00464		03/14/95	17:55	69.95260	TGW	
SI -202-R2						
02/06/95-016	64.84980	03/13/95	17:08	65.26230	TGW	65.27030
	0.00000	03/14/95	10:47	65.27010	TGW	
95-403-00465		03/14/95	17:56	65.27030	TGW	
SI -202-R2						
75.00000						
75.00000						

ETS, Inc.
GRAVIMETRIC LABORATORY DATA
Final Beaker Weights

Job Number: 95-403
Report Prepared on: 03/17/95

Beaker # / Filter # / Sample # / Run I.D. / Total Vol.,ml / Aliquot Vol.	Constant Tare Weight (g) / Beaker / Filter	Final Weight Data: Date	Time	Weight (g)	Analyst	Constant Final Weight (g)
12/01/94-035	67.26710	03/14/95	14:24	67.28160	TGW	67.28150
	0.00000	03/15/95	12:44	67.28150	TGW	
95-403-00466						
SI -202-R2						
12/01/94-036	70.23860	03/14/95	14:25	70.24930	TGW	70.24910
	0.00000	03/15/95	12:44	70.24910	TGW	
95-403-00466						
SI -202-R2						
12/10/94-027	70.17570	03/14/95	14:25	70.18410	TGW	70.18380
	0.00000	03/15/95	12:45	70.18380	TGW	
95-403-00466						
SI -202-R2						
12/01/94-033	67.21710	03/14/95	14:24	67.24300	TGW	67.24240
	0.00000	03/15/95	12:44	67.24200	TGW	
95-403-00469		03/16/95	16:23	67.24240	TGW	
SI -202-R2						
12/01/94-034	67.11390	03/14/95	14:24	67.11690	TGW	67.11600
	0.00000	03/15/95	12:44	67.11560	TGW	
95-403-00469		03/16/95	16:23	67.11600	TGW	
SI -202-R2						

ETS, Inc.
GRAVIMETRIC LABORATORY DATA
Final Beaker Weights

Job Number: 95-403
Report Prepared on: 03/17/95

Beaker # / Filter # / Sample # / Run I.D. / Total Vol.,ml / Aliquot Vol.	Constant Tare Weight (g) Beaker / Filter	Final Weight Data Date	Time	Weight (g)	Analyst	Constant Final Weight (g)
02/06/95-017	67.59160	03/13/95	17:09	68.14210	TGW	68.13730
Q01/18/95-0047	0.39200	03/14/95	10:47	68.13720	TGW	
95-403-00472		03/14/95	17:56	68.13730	TGW	
SI -202-R3						
02/06/95-018	65.16540	03/13/95	17:09	65.60460	TGW	65.60830
	0.00000	03/14/95	10:47	65.60850	TGW	
95-403-00473		03/14/95	17:56	65.60830	TGW	
SI -202-R3						
75.00000						
75.00000						
12/10/94-030	63.91180	03/14/95	14:26	63.92150	TGW	63.92200
	0.00000	03/15/95	12:46	63.92200	TGW	
95-403-00474						
SI -202-R3						
12/10/94-031	64.27730	03/14/95	14:26	64.28580	TGW	64.28610
	0.00000	03/15/95	12:46	64.28610	TGW	
95-403-00474						
SI -202-R3						
12/10/94-032	66.76520	03/14/95	14:27	66.77180	TGW	66.77300
	0.00000	03/15/95	12:46	66.77250	TGW	
95-403-00474		03/16/95	16:24	66.77300	TGW	
SI -202-R3						

ETS, Inc.
GRAVIMETRIC LABORATORY DATA
Final Beaker Weights

Job Number: 95-403
Report Prepared on: 03/17/95

Beaker # / Filter # / Sample # / Run I.D. / Total Vol.,ml / Aliquot Vol.	Constant Tare Weight (g) / Beaker / Filter	Final Weight Data: Date	Time	Weight (g)	Analyst	Constant Final Weight (g)
12/10/94-028	67.44960	03/14/95	14:25	67.46570	TGW	67.46580
	0.00000	03/15/95	12:45	67.46580	TGW	
95-403-00477						
SI -202-R3						
12/10/94-029	69.97700	03/14/95	14:26	69.97840	TGW	69.97840
	0.00000	03/15/95	12:45	69.97840	TGW	
95-403-00477						
SI -202-R3						
02/06/95-025	65.11030	03/13/95	17:07	65.50400	TGW	65.49750
Q01/18/95-0048	0.39260	03/14/95	10:45	65.49800	TGW	
95-403-00480		03/14/95	17:59	65.49750	TGW	
BLK -202-R0						
02/06/95-026	64.95670	03/13/95	17:08	64.95170	TGW	64.95560
	0.00000	03/14/95	10:45	64.95590	TGW	
95-403-00481		03/14/95	18:00	64.95560	TGW	
BLK -202-R0						
80.00000						
80.00000						
12/10/94-023	67.02420	03/14/95	14:35	67.02550	TGW	67.02590
	0.00000	03/15/95	12:51	67.02640	TGW	
95-403-00482		03/16/95	16:27	67.02590	TGW	
BLK -202-R0						

ETS, Inc.
GRAVIMETRIC LABORATORY DATA
Final Beaker Weights

Job Number: 95-403
Report Prepared on: 03/17/95

Beaker # / Filter # / Sample # / Run I.D. / Total Vol.,ml / Aliquot Vol.	Constant Tare Weight (g) / Beaker / Filter	Final Weight Data: Date	Time	Weight (g)	Analyst	Constant Final Weight (g)
12/10/94-024	65.31330	03/14/95	14:35	65.31310	TGW	65.31360
	0.00000	03/15/95	12:51	65.31360	TGW	
95-403-00482						
BLK -202-R0						
12/10/94-022	70.31920	03/14/95	14:34	70.31810	TGW	70.31860
	0.00000	03/15/95	12:50	70.31880	TGW	
95-403-00485		03/16/95	16:26	70.31860	TGW	
BLK -202-R0						
02/06/95-027	64.03970	03/14/95	14:35	64.04000	TGW	64.04030
	0.00000	03/15/95	12:51	64.04030	TGW	
95-403-00485						
BLK -202-R0						

APPENDIX H

METALS LABORATORY DATA

ETS Analytical Services, Inc.

Proudly serving industry and government since 1973.

A USEPA Contract Laboratory

A subsidiary of ETS International, Inc.

ETS, Inc.
1401 Municipal Road N.W.
Roanoke, VA 24012
ATTN: Mr. Andy Hetz

Re: Laboratory Analysis
ETSAS Client No. 6593
Contract #95-403-T

REPORT DATE/NUMBER: March 17, 1995 / 327

ANALYSIS FOR: 7 Method 5 Sampling Trains for 7 ICP Metals

METHOD OF ANALYSIS: EPA Method 5, SW-846 Method 6010A

SAMPLE ANALYSIS DATA

CLIENT ID: SO-M5-R1
MATRIX: FILTER/AQ
COLLECTION DATE: / /
OTHER ID: 95-403-T
DESCRIPTION: 1A & 1B

LAB ID: 175640
COLLECTED BY: ETS, INC.
DATE RECEIVED: 03/15/95
TIME COLLECTED:

METALS/ELEMENTS RESULTS:

Calcium — **531 ug, Total**
↳Analysis Date: 03/16/95 by: KO Run ID: 031695ETS
↳Method: ICP, SW-846 Method 6010A; Det Limit= 60.0 ug, Total
↳Comments: Initial Volume for Fraction 1A and 1B = 112 mls

Iron — **192 ug, Total**
↳Analysis Date: 03/16/95 by: KO Run ID: 031695ETS
↳Method: ICP, SW-846 Method 6010A; Det Limit= 6.0 ug, Total
↳Comments: Initial Volume for Fraction 1A and 1B = 112 mls

Manganese — **192 ug, Total**
↳Analysis Date: 03/16/95 by: KO Run ID: 031695ETS
↳Method: ICP, SW-846 Method 6010A; Det Limit= 0.30 ug, Total
↳Comments: Initial Volume for Fraction 1A and 1B = 112 mls

Phosphorus — **< 300 ug, Total**
↳Analysis Date: 03/16/95 by: KO Run ID: 031695ETS
↳Method: ICP, SW-846 Method 6010A; Det Limit= 300 ug, Total
↳Comments: Initial Volume for Fraction 1A and 1B = 112 mls

REPORT CONTINUED ON NEXT PAGE

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SAMPLE ANALYSIS DATA

CLIENT ID: SO-M5-R1 ▪ LAB ID: 175640 (continued)

Potassium — **25200 ug, Total**
↳Analysis Date: 03/16/95 by: KO Run ID: 031695ETS
↳Method: ICP, SW-846 Method 6010A; Det Limit= 300 ug, Total
↳Comments: Initial Volume for Fraction 1A and 1B = 112 mls

Sodium — **9300 ug, Total**
↳Analysis Date: 03/16/95 by: KO Run ID: 031695ETS
↳Method: ICP, SW-846 Method 6010A; Det Limit= 150 ug, Total
↳Comments: Initial Volume for Fraction 1A and 1B = 112 mls

Sulfur — **5190 ug, Total**
↳Analysis Date: 03/16/95 by: KO Run ID: 031695ETS
↳Method: ICP, SW-846 Method 6010A; Det Limit= 300 ug, Total
↳Comments: Initial Volume for Fraction 1A and 1B = 112 mls

CLIENT ID: SO-M5-R2 **LAB ID: 175641**
MATRIX: FILTER/AQ COLLECTED BY: ETS, INC.
COLLECTION DATE: / / DATE RECEIVED: 03/15/95
OTHER ID: 95-403-T TIME COLLECTED:
DESCRIPTION: 1A & 1B

Calcium — **696 ug, Total**
↳Analysis Date: 03/16/95 by: KO Run ID: 031695ETS
↳Method: ICP, SW-846 Method 6010A; Det Limit= 60.0 ug, Total
↳Comments: Initial Volume for Fraction 1A and 1B = 120 mls

Iron — **186 ug, Total**
↳Analysis Date: 03/16/95 by: KO Run ID: 031695ETS
↳Method: ICP, SW-846 Method 6010A; Det Limit= 6.0 ug, Total
↳Comments: Initial Volume for Fraction 1A and 1B = 120 mls

Manganese — **159 ug, Total**
↳Analysis Date: 03/16/95 by: KO Run ID: 031695ETS
↳Method: ICP, SW-846 Method 6010A; Det Limit= 0.30 ug, Total
↳Comments: Initial Volume for Fraction 1A and 1B = 120 mls

Phosphorus — **< 300 ug, Total**
↳Analysis Date: 03/16/95 by: KO Run ID: 031695ETS
↳Method: ICP, SW-846 Method 6010A; Det Limit= 300 ug, Total
↳Comments: Initial Volume for Fraction 1A and 1B = 120 mls

Potassium — **19860 ug, Total**
↳Analysis Date: 03/16/95 by: KO Run ID: 031695ETS
↳Method: ICP, SW-846 Method 6010A; Det Limit= 300 ug, Total
↳Comments: Initial Volume for Fraction 1A and 1B = 120 mls

REPORT CONTINUED ON NEXT PAGE

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SAMPLE ANALYSIS DATA

CLIENT ID: SO-M5-R2 ▪ LAB ID: 175641 (continued)

Sodium — **4380 ug, Total**
↳Analysis Date: 03/16/95 by: KO Run ID: 031695ETS
↳Method: ICP, SW-846 Method 6010A; Det Limit= 150 ug, Total
↳Comments: Initial Volume for Fraction 1A and 1B = 120 mls

Sulfur — **4800 ug, Total**
↳Analysis Date: 03/16/95 by: KO Run ID: 031695ETS
↳Method: ICP, SW-846 Method 6010A; Det Limit= 300 ug, Total
↳Comments: Initial Volume for Fraction 1A and 1B = 120 mls

CLIENT ID: SO-M5-R3 **LAB ID: 175642**
MATRIX: FILTER/AQ COLLECTED BY: ETS, INC.
COLLECTION DATE: / / DATE RECEIVED: 03/15/95
OTHER ID: 95-403-T TIME COLLECTED:
DESCRIPTION: 1A & 1B

Calcium — **486 ug, Total**
↳Analysis Date: 03/16/95 by: KO Run ID: 031695ETS
↳Method: ICP, SW-846 Method 6010A; Det Limit= 60.0 ug, Total
↳Comments: Initial Volume for Fraction 1A and 1B = 108 mls

Iron — **171 ug, Total**
↳Analysis Date: 03/16/95 by: KO Run ID: 031695ETS
↳Method: ICP, SW-846 Method 6010A; Det Limit= 6.0 ug, Total
↳Comments: Initial Volume for Fraction 1A and 1B = 108 mls

Manganese — **168 ug, Total**
↳Analysis Date: 03/16/95 by: KO Run ID: 031695ETS
↳Method: ICP, SW-846 Method 6010A; Det Limit= 0.30 ug, Total
↳Comments: Initial Volume for Fraction 1A and 1B = 108 mls

Phosphorus — **< 300 ug, Total**
↳Analysis Date: 03/16/95 by: KO Run ID: 031695ETS
↳Method: ICP, SW-846 Method 6010A; Det Limit= 300 ug, Total
↳Comments: Initial Volume for Fraction 1A and 1B = 108 mls

Potassium — **20280 ug, Total**
↳Analysis Date: 03/16/95 by: KO Run ID: 031695ETS
↳Method: ICP, SW-846 Method 6010A; Det Limit= 300 ug, Total
↳Comments: Initial Volume for Fraction 1A and 1B = 108 mls

Sodium — **7650 ug, Total**
↳Analysis Date: 03/16/95 by: KO Run ID: 031695ETS
↳Method: ICP, SW-846 Method 6010A; Det Limit= 150 ug, Total
↳Comments: Initial Volume for Fraction 1A and 1B = 108 mls

REPORT CONTINUED ON NEXT PAGE

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SAMPLE ANALYSIS DATA

CLIENT ID: SO-M5-R3 ▪ LAB ID: 175642 (continued)

Sulfur — **4380 ug, Total**
↳Analysis Date: 03/16/95 by: KO Run ID: 031695ETS
↳Method: ICP, SW-846 Method 6010A; Det Limit= 300 ug, Total
↳Comments: Initial Volume for Fraction 1A and 1B = 108 mls

CLIENT ID: SI-M5-R1 **LAB ID: 175643**
MATRIX: FILTER/AQ COLLECTED BY: ETS, INC.
COLLECTION DATE: / / DATE RECEIVED: 03/15/95
OTHER ID: 95-403-T TIME COLLECTED:
DESCRIPTION: 1A & 1B

Calcium — **11820 ug, Total**
↳Analysis Date: 03/16/95 by: KO Run ID: 031695ETS
↳Method: ICP, SW-846 Method 6010A; Det Limit= 60.0 ug, Total
↳Comments: Initial Volume for Fraction 1A and 1B = 110 mls

Iron — **777 ug, Total**
↳Analysis Date: 03/16/95 by: KO Run ID: 031695ETS
↳Method: ICP, SW-846 Method 6010A; Det Limit= 6.0 ug, Total
↳Comments: Initial Volume for Fraction 1A and 1B = 110 mls

Manganese — **534 ug, Total**
↳Analysis Date: 03/16/95 by: KO Run ID: 031695ETS
↳Method: ICP, SW-846 Method 6010A; Det Limit= 0.30 ug, Total
↳Comments: Initial Volume for Fraction 1A and 1B = 110 mls

Phosphorus — **864 ug, Total**
↳Analysis Date: 03/16/95 by: KO Run ID: 031695ETS
↳Method: ICP, SW-846 Method 6010A; Det Limit= 300 ug, Total
↳Comments: Initial Volume for Fraction 1A and 1B = 110 mls

Potassium — **27810 ug, Total**
↳Analysis Date: 03/16/95 by: KO Run ID: 031695ETS
↳Method: ICP, SW-846 Method 6010A; Det Limit= 300 ug, Total
↳Comments: Initial Volume for Fraction 1A and 1B = 110 mls

Sodium — **12690 ug, Total**
↳Analysis Date: 03/16/95 by: KO Run ID: 031695ETS
↳Method: ICP, SW-846 Method 6010A; Det Limit= 150 ug, Total
↳Comments: Initial Volume for Fraction 1A and 1B = 110 mls

Sulfur — **4650 ug, Total**
↳Analysis Date: 03/16/95 by: KO Run ID: 031695ETS
↳Method: ICP, SW-846 Method 6010A; Det Limit= 300 ug, Total
↳Comments: Initial Volume for Fraction 1A and 1B = 110 mls

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SAMPLE ANALYSIS DATA

CLIENT ID: SI-M5-R1 ■ LAB ID: 175643 (continued)

CLIENT ID: SI-M5-R2 | **LAB ID: 175644**
MATRIX: FILTER/AQ | COLLECTED BY: ETS, INC.
COLLECTION DATE: / / | DATE RECEIVED: 03/15/95
OTHER ID: 95-403-T | TIME COLLECTED:
DESCRIPTION: 1A & 1B

Calcium — **14580 ug, Total**
↳Analysis Date: 03/16/95 by: KO Run ID: 031695ETS
↳Method: ICP, SW-846 Method 6010A; Det Limit= 60.0 ug, Total
↳Comments: Initial Volume for Fraction 1A and 1B = 120 mls

Iron — **726 ug, Total**
↳Analysis Date: 03/16/95 by: KO Run ID: 031695ETS
↳Method: ICP, SW-846 Method 6010A; Det Limit= 6.0 ug, Total
↳Comments: Initial Volume for Fraction 1A and 1B = 120 mls

Manganese — **519 ug, Total**
↳Analysis Date: 03/16/95 by: KO Run ID: 031695ETS
↳Method: ICP, SW-846 Method 6010A; Det Limit= 0.30 ug, Total
↳Comments: Initial Volume for Fraction 1A and 1B = 120 mls

Phosphorus — **909 ug, Total**
↳Analysis Date: 03/16/95 by: KO Run ID: 031695ETS
↳Method: ICP, SW-846 Method 6010A; Det Limit= 300 ug, Total
↳Comments: Initial Volume for Fraction 1A and 1B = 120 mls

Potassium — **22740 ug, Total**
↳Analysis Date: 03/16/95 by: KO Run ID: 031695ETS
↳Method: ICP, SW-846 Method 6010A; Det Limit= 300 ug, Total
↳Comments: Initial Volume for Fraction 1A and 1B = 120 mls

Sodium — **6600 ug, Total**
↳Analysis Date: 03/16/95 by: KO Run ID: 031695ETS
↳Method: ICP, SW-846 Method 6010A; Det Limit= 150 ug, Total
↳Comments: Initial Volume for Fraction 1A and 1B = 120 mls

Sulfur — **5070 ug, Total**
↳Analysis Date: 03/16/95 by: KO Run ID: 031695ETS
↳Method: ICP, SW-846 Method 6010A; Det Limit= 300 ug, Total
↳Comments: Initial Volume for Fraction 1A and 1B = 120 mls

CLIENT ID: SI-M5-R3 | **LAB ID: 175645**
MATRIX: FILTER/AQ | COLLECTED BY: ETS, INC.
COLLECTION DATE: / / | DATE RECEIVED: 03/15/95
OTHER ID: 95-403-T | TIME COLLECTED:
DESCRIPTION: 1A & 1B

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SAMPLE ANALYSIS DATA

CLIENT ID: SI-M5-R3 ▪ LAB ID: 175645 (continued)

Calcium — **13590 ug, Total**
↳Analysis Date: 03/16/95 by: KO Run ID: 031695ETS
↳Method: ICP, SW-846 Method 6010A; Det Limit= 60.0 ug, Total
↳Comments: Initial Volume for Fraction 1A and 1B = 130 mls

Iron — **1029 ug, Total**
↳Analysis Date: 03/16/95 by: KO Run ID: 031695ETS
↳Method: ICP, SW-846 Method 6010A; Det Limit= 6.0 ug, Total
↳Comments: Initial Volume for Fraction 1A and 1B = 130 mls

Manganese — **552 ug, Total**
↳Analysis Date: 03/16/95 by: KO Run ID: 031695ETS
↳Method: ICP, SW-846 Method 6010A; Det Limit= 0.30 ug, Total
↳Comments: Initial Volume for Fraction 1A and 1B = 130 mls

Phosphorus — **831 ug, Total**
↳Analysis Date: 03/16/95 by: KO Run ID: 031695ETS
↳Method: ICP, SW-846 Method 6010A; Det Limit= 300 ug, Total
↳Comments: Initial Volume for Fraction 1A and 1B = 130 mls

Potassium — **19530 ug, Total**
↳Analysis Date: 03/16/95 by: KO Run ID: 031695ETS
↳Method: ICP, SW-846 Method 6010A; Det Limit= 300 ug, Total
↳Comments: Initial Volume for Fraction 1A and 1B = 130 mls

Sodium — **8130 ug, Total**
↳Analysis Date: 03/16/95 by: KO Run ID: 031695ETS
↳Method: ICP, SW-846 Method 6010A; Det Limit= 150 ug, Total
↳Comments: Initial Volume for Fraction 1A and 1B = 130 mls

Sulfur — **5490 ug, Total**
↳Analysis Date: 03/16/95 by: KO Run ID: 031695ETS
↳Method: ICP, SW-846 Method 6010A; Det Limit= 300 ug, Total
↳Comments: Initial Volume for Fraction 1A and 1B = 130 mls

CLIENT ID: BLANK **LAB ID: 175646**
MATRIX: FILTER/AQ COLLECTED BY: ETS, INC.
COLLECTION DATE: / / DATE RECEIVED: 03/15/95
OTHER ID: 95-403-T TIME COLLECTED:
DESCRIPTION: 1A & 1B

Calcium — **< 60.0 ug, Total**
↳Analysis Date: 03/16/95 by: KO Run ID: 031695ETS
↳Method: ICP, SW-846 Method 6010A; Det Limit= 60.0 ug, Total
↳Comments: Initial Volume for Fraction 1A and 1B = 115 mls

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SAMPLE ANALYSIS DATA

CLIENT ID: BLANK ▪ LAB ID: 175646 (continued)

Iron — **20.4 ug, Total**
↳Analysis Date: 03/16/95 by: KO Run ID: 031695ETS
↳Method: ICP, SW-846 Method 6010A; Det Limit= 6.0 ug, Total
↳Comments: Initial Volume for Fraction 1A and 1B = 115 mls

Manganese — **0.90 ug, Total**
↳Analysis Date: 03/16/95 by: KO Run ID: 031695ETS
↳Method: ICP, SW-846 Method 6010A; Det Limit= 0.30 ug, Total
↳Comments: Initial Volume for Fraction 1A and 1B = 115 mls

Phosphorus — **< 300 ug, Total**
↳Analysis Date: 03/16/95 by: KO Run ID: 031695ETS
↳Method: ICP, SW-846 Method 6010A; Det Limit= 300 ug, Total
↳Comments: Initial Volume for Fraction 1A and 1B = 115 mls

Potassium — **< 300 ug, Total**
↳Analysis Date: 03/16/95 by: KO Run ID: 031695ETS
↳Method: ICP, SW-846 Method 6010A; Det Limit= 300 ug, Total
↳Comments: Initial Volume for Fraction 1A and 1B = 115 mls

Sodium — **555 ug, Total**
↳Analysis Date: 03/16/95 by: KO Run ID: 031695ETS
↳Method: ICP, SW-846 Method 6010A; Det Limit= 150 ug, Total
↳Comments: Initial Volume for Fraction 1A and 1B = 115 mls

Sulfur — **384 ug, Total**
↳Analysis Date: 03/16/95 by: KO Run ID: 031695ETS
↳Method: ICP, SW-846 Method 6010A; Det Limit= 300 ug, Total
↳Comments: Initial Volume for Fraction 1A and 1B = 115 mls

Quality Assurance performed on the above data is presented on the following page(s).

If we may be of further assistance, please contact us at any time.

Sincerely,
ETS ANALYTICAL SERVICES, INC.

Susanne H. Deegan

Susanne H. Deegan, Project Manager

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QUALITY ASSURANCE SUMMARY

CALIBRATION VERIFICATION

ANALYTE	UNITS	TYPE	TRUE	FOUND	% REC	QAO	RUN ID
Calcium	ug/l	CCV1	50000	48600	97.2	90-110%	031695ETS
Iron	ug/l	CCV1	10000	10100	101.0	90-110%	031695ETS
Manganese	ug/l	CCV1	2500	2490	99.6	90-110%	031695ETS
Phosphorus	ug/l	CCV1	5000	5080	101.6	90-110%	031695ETS
Potassium	ug/l	CCV1	50000	48700	97.4	90-110%	031695ETS
Sodium	ug/l	CCV1	50000	49400	98.8	90-110%	031695ETS
Sulfur	ug/l	CCV1	5000	5030	100.6	90-110%	031695ETS
Calcium	ug/l	CCV2	50000	47000	94.0	90-110%	031695ETS
Iron	ug/l	CCV2	10000	9560	95.6	90-110%	031695ETS
Manganese	ug/l	CCV2	2500	2410	96.4	90-110%	031695ETS
Phosphorus	ug/l	CCV2	5000	5170	103.4	90-110%	031695ETS
Potassium	ug/l	CCV2	50000	48000	96.0	90-110%	031695ETS
Sodium	ug/l	CCV2	50000	47900	95.8	90-110%	031695ETS
Sulfur	ug/l	CCV2	5000	5240	104.8	90-110%	031695ETS
Calcium	ug/l	CCV3	50000	45400	90.8	90-110%	031695ETS
Iron	ug/l	CCV3	10000	9310	93.1	90-110%	031695ETS
Manganese	ug/l	CCV3	2500	2300	92.0	90-110%	031695ETS
Phosphorus	ug/l	CCV3	5000	5010	100.2	90-110%	031695ETS
Potassium	ug/l	CCV3	50000	46600	93.2	90-110%	031695ETS
Sodium	ug/l	CCV3	50000	45900	91.8	90-110%	031695ETS
Sulfur	ug/l	CCV3	5000	4810	96.2	90-110%	031695ETS
Sulfur	ug/l	CCV4	5000	5160	103.2	90-110%	031695ETS
Calcium	ug/l	ICSABF	525385	467000	88.9	80-120%	031695ETS
Iron	ug/l	ICSABF	187957	186000	99.0	80-120%	031695ETS
Manganese	ug/l	ICSABF	502.0	438.0	87.3	80-120%	031695ETS
Calcium	ug/l	ICSABI	525385	506000	96.3	80-120%	031695ETS
Iron	ug/l	ICSABI	187957	202000	107.5	80-120%	031695ETS
Manganese	ug/l	ICSABI	502.0	476.0	94.8	80-120%	031695ETS
Calcium	ug/l	ICV1	48810	50000	102.4	90-110%	031695ETS

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QUALITY ASSURANCE SUMMARY
Continued

CALIBRATION VERIFICATION

ANALYTE	UNITS	TYPE	TRUE	FOUND	% REC	QAO	RUN ID
Iron	ug/l	ICV1	1962	2040	104.0	90-110%	031695ETS
Manganese	ug/l	ICV1	474.0	507.0	107.0	90-110%	031695ETS
Phosphorus	ug/l	ICV1	2500	2480	99.2	90-110%	031695ETS
Potassium	ug/l	ICV1	49182	50300	102.3	90-110%	031695ETS
Sodium	ug/l	ICV1	46804	50900	108.8	90-110%	031695ETS
Sulfur	ug/l	ICV1	2500	2470	98.8	90-110%	031695ETS

BLANKS

ANALYTE	UNITS	TYPE	FOUND	QAO	RUN ID
Calcium	ug/l	CCB1	<200	<200 ug/l	031695ETS
Iron	ug/l	CCB1	<20.0	<20 ug/l	031695ETS
Manganese	ug/l	CCB1	<1.00	<1 ug/l	031695ETS
Phosphorus	ug/l	CCB1	<1000	<1000 ug/l	031695ETS
Potassium	ug/l	CCB1	<1000	<1000 ug/l	031695ETS
Sodium	ug/l	CCB1	<500	<500 ug/l	031695ETS
Sulfur	ug/l	CCB1	<1000	<1000 ug/l	031695ETS
Calcium	ug/l	CCB2	<200	<200 ug/l	031695ETS
Iron	ug/l	CCB2	<20.0	<20 ug/l	031695ETS
Manganese	ug/l	CCB2	<1.00	<1 ug/l	031695ETS
Phosphorus	ug/l	CCB2	<1000	<1000 ug/l	031695ETS
Potassium	ug/l	CCB2	<1000	<1000 ug/l	031695ETS
Sodium	ug/l	CCB2	<500	<500 ug/l	031695ETS
Sulfur	ug/l	CCB2	<1000	<1000 ug/l	031695ETS

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QUALITY ASSURANCE SUMMARY
Continued

BLANKS

ANALYTE	UNITS	TYPE	FOUND	QAO	RUN ID
Calcium	ug/l	CCB3	<200	<200 ug/l	031695ETS
Iron	ug/l	CCB3	<20.0	<20 ug/l	031695ETS
Manganese	ug/l	CCB3	<1.00	<1 ug/l	031695ETS
Phosphorus	ug/l	CCB3	<1000	<1000 ug/l	031695ETS
Potassium	ug/l	CCB3	<1000	<1000 ug/l	031695ETS
Sodium	ug/l	CCB3	<500	<500 ug/l	031695ETS
Sulfur	ug/l	CCB3	<1000	<1000 ug/l	031695ETS
Sulfur	ug/l	CCB4	<1000	<1000 ug/l	031695ETS
Calcium	ug/l	ICB1	<200	<200 ug/l	031695ETS
Iron	ug/l	ICB1	<20.0	<20 ug/l	031695ETS
Manganese	ug/l	ICB1	<1.00	<1 ug/l	031695ETS
Phosphorus	ug/l	ICB1	<1000	<1000 ug/l	031695ETS
Potassium	ug/l	ICB1	<1000	<1000 ug/l	031695ETS
Sodium	ug/l	ICB1	<500	<500 ug/l	031695ETS
Sulfur	ug/l	ICB1	<1000	<1000 ug/l	031695ETS

DUPLICATES

LAB ID	ANALYTE	TYPE	SAMPLE	DUP	UNITS	RPD	QAO	RUN ID
175640	Calcium	DUP	1770	1730	ug/l	2.3	≤20 RPD	031695ETS
175640	Iron	DUP	639	746	ug/l	15.5	≤20 RPD	031695ETS
175640	Manganese	DUP	638	639	ug/l	0.2	≤20 RPD	031695ETS
175640	Phosphorus	DUP	<1000	<1000	ug/l	NC	≤20 RPD	031695ETS
175640	Potassium	DUP	87100	84100	ug/l	3.5	≤20 RPD	031695ETS

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QUALITY ASSURANCE SUMMARY
Continued

DUPLICATES

LAB ID	ANALYTE	TYPE	SAMPLE	DUP	UNITS	RPD	QAO	RUN ID
175640	Sodium	DUP	31000	30800	ug/l	0.6	≤20 RPD	031695ETS
175640	Sulfur	DUP	17300	17100	ug/l	1.2	≤20 RPD	031695ETS

SPIKES

LAB ID	ANALYTE	TYPE	SAMPLE	SPK	ADDED	%REC	QAO	RUN ID
175640	Calcium	MS	1770	58800	50000	114.1	75-125%	031695ETS
175640	Iron	MS	639.0	1710	1000	107.1	75-125%	031695ETS
175640	Manganese	MS	638.0	821.0	200.0	91.5	75-125%	031695ETS
175640	Phosphorus	MS	<1000	5580	5000	111.6	75-125%	031695ETS
175640	Potassium	MS	84000	99400	20000	77.0	75-125%	031695ETS
175640	Sodium	MS	31000	84100	50000	106.2	75-125%	031695ETS
175640	Sulfur	MS	17300	34900	20000	88.0	75-125%	031695ETS

QAO: Quality Assurance Objective; REC: Recovery; RPD: Relative Percent Difference; NC: Not Calculatable.
DUP: Duplicate Analysis Result; SPK: Spiked Analysis Result; MS: Matrix SPK; MSD: Matrix SPK Duplicate.
For Duplicates <5X the Detection Limit (DL), ± DL shall apply for the QAO unless otherwise specified.

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E T S , I N C .

METER CONSOLE CALIBRATION FORM

Contract No. 94-344
Job I.D.

Print Date 12/02/94

Meter Box No.: 6
Delta H: 1.7269
Gamma: 0.9993

Analyst: [signature]
Calibration Date: 12/02/94
Test Meter No. 9548
Barometric Pressure 29.19

QA/QC Check: Lynne Sutton 12/2/94
Previous Calibration Date: 09/12/94
Previous Gamma: 1.0134

Run	Orf Set	Initial Test	Final Test	Volume Test	Init Temp	Finl Temp	Test Temp	Initial Box	Final Box	Volume Box	I-I Temp	I-O Temp	F-I Temp	F-O Temp	Temp	Time	Delta H	Gamma
1	0.5	958.049	968.418	10.369	73.0	74.0	73.50	975.830	986.292	10.462	76.0	74.0	77.0	81.0	77.00	25.0	1.67300	0.99636
2	1.0	968.809	980.199	11.390	74.0	74.0	74.00	986.689	998.217	11.528	81.0	72.0	78.0	85.0	79.00	19.5	1.68399	0.99477
3	1.5	980.388	990.461	10.073	74.0	74.0	74.00	998.389	1008.59	10.204	84.0	78.0	79.0	87.0	82.00	14.5	1.77590	0.99818
4	2.0	990.704	1001.65	10.946	74.0	74.0	74.00	1008.84	1019.89	11.045	85.0	79.0	79.0	88.0	82.75	13.5	1.73578	1.00223
5	2.5	1001.85	1013.14	11.293	73.0	74.0	73.50	1020.11	1031.51	11.399	86.0	79.0	80.0	89.0	83.50	12.5	1.74195	1.00295
6	3.0	1013.35	1023.70	10.353	73.0	73.0	73.00	1031.74	1042.21	10.469	87.0	80.0	80.0	88.0	83.75	10.5	1.75085	1.00130

R

E.T.S. INC.
METER CONSOLE CALIBRATION FORM

Meter Box No..... 6 REFERENCE CALIBRATOR HH71 CAL-K
THERMOCOUPLE NUMBER 1 Date 21-Sep-94

	Reference Temperature	Thermocouple Temperature	Difference %
1	0	0	0.000
2	32	31	0.203
3	100	99	0.179
4	200	201	-0.152
5	300	301	-0.132
6	400	399	0.116
7	500	499	0.104
8	600	601	-0.094
9	700	700	0.000
10	800	799	0.079
11	900	900	0.000
			0.028 AVERAGE DIFF

Calibration Performed By ..... MICK BERKHEAD

Post Test Calibration-Contract #\- _____

Pre-Test Calibration-Contract #- _____

Comments:

R

E.T.S. INC.
METER CONSOLE CALIBRATION FORM

Meter Box No..... 6 REFERENCE CALIBRATOR H471 CAL-K
THERMOCOUPLE NUMBER 2 Date 21-Sep-94

	Reference Temperature	Thermocouple Temperature	Difference %
1	0	0	0.000
2	32	31	0.203
3	100	99	0.179
4	200	201	-0.152
5	300	301	-0.132
6	400	399	0.116
7	500	499	0.104
8	600	601	-0.094
9	700	700	0.000
10	800	800	0.000
11	900	900	0.000
			0.020 AVERAGE DIFF

Calibration Performed By ..... MICK BERKHEAD

Post Test Calibration-Contract #\- _____

Pre-Test Calibration-Contract #- _____

Comments:

R

E.T.S. INC.
METER CONSOLE CALIBRATION FORM

Meter Box No..... 6 REFERENCE CALIBRATOR HH71 CAL-K
THERMOCOUPLE NUMBER 3 Date 21-Sep-94

	Reference Temperature	Thermocouple Temperature	Difference %
1	0	0	0.000
2	32	31	0.203
3	100	99	0.179
4	200	200	0.000
5	300	301	-0.132
6	400	400	0.000
7	500	499	0.104
8	600	600	0.000
9	700	700	0.000
10	800	799	0.079
11	900	900	0.000
			0.039 AVERAGE DIFF

Calibration Performed By ..... MICK BERKHEAD

Post Test Calibration-Contract #\- _____

Pre-Test Calibration-Contract #- _____

Comments:

R

E.T.S. INC.
METER CONSOLE CALIBRATION FORM

Meter Box No..... 6 REFERENCE CALIBRATOR HH71 CAL-K
THERMOCOUPLE NUMBER 4 Date 21-Sep-94

	Reference Temperature	Thermocouple Temperature	Difference %
1	0	0	0.000
2	32	31	0.203
3	100	99	0.179
4	200	200	0.000
5	300	301	-0.132
6	400	399	0.116
7	500	499	0.104
8	600	600	0.000
9	700	700	0.000
10	800	799	0.079
11	900	900	0.000
			0.050 AVERAGE DIFF

Calibration Performed By ..... MICK BERKHEAD

Post Test Calibration-Contract #\- _____

Pre-Test Calibration-Contract #- _____

Comments:

R

E.T.S. INC.
METER CONSOLE CALIBRATION FORM

Meter Box No..... 6 REFERENCE CALIBRATOR HH71 CAL-K
THERMOCOUPLE NUMBER 5 Date 21-Sep-94

	Reference Temperature	Thermocouple Temperature	Difference %
1	0	0	0.000
2	32	31	0.203
3	100	99	0.179
4	200	200	0.000
5	300	301	-0.132
6	400	400	0.000
7	500	499	0.104
8	600	601	-0.094
9	700	700	0.000
10	800	799	0.079
11	900	900	0.000
			0.031 AVERAGE DIFF

Calibration Performed By ..... MICK BERKHEAD

Post Test Calibration-Contract #\- _____

Pre-Test Calibration-Contract #- _____

Comments:

R

E.T.S. INC.
METER CONSOLE CALIBRATION FORM

Meter Box No..... 6 REFERENCE CALIBRATOR HH71 CAL-K
THERMOCOUPLE NUMBER 6 Date 21-Sep-94

	Reference Temperature	Thermocouple Temperature	Difference %
1	0	1	-0.217
2	32	31	0.203
3	100	99	0.179
4	200	200	0.000
5	300	301	-0.132
6	400	399	0.116
7	500	499	0.104
8	600	600	0.000
9	700	700	0.000
10	800	799	0.079
11	900	899	0.074
			0.037 AVERAGE DIFF

Calibration Performed By ..... MICK BERKHEAD

Post Test Calibration-Contract #\- _____

Pre-Test Calibration-Contract #- _____

Comments:

R

E.T.S. INC.
METER CONSOLE CALIBRATION FORM

Meter Box No..... 6 REFERENCE CALIBRATOR HH71 CAL-K
THERMOCOUPLE NUMBER 7 Date 21-Sep-94

	Reference Temperature	Thermocouple Temperature	Difference %
1	0	0	0.000
2	32	31	0.203
3	100	99	0.179
4	200	200	0.000
5	300	301	-0.132
6	400	400	0.000
7	500	499	0.104
8	600	601	-0.094
9	700	700	0.000
10	800	799	0.079
11	900	900	0.000
			0.031 AVERAGE DIFF

Calibration Performed By ..... MICK BERKHEAD

Post Test Calibration-Contract #\- _____

Pre-Test Calibration-Contract #- _____

Comments:

E T S , I N C .

METER CONSOLE CALIBRATION FORM

Contract No. reset
Job I.D.

Print Date 03/06/95

Meter Box No.: 12
Delta H: 1.8053
Gamma: 0.9885

Analyst:
Calibration Date: 03/06/95
Test Meter No. 9548
Barometric Pressure 28.91

QA/QC Check: Lynne Sexton 3/7/95
Previous Calibration Date: 01/18/95
Previous Gamma: 0.9928

Run	Orf Set	Initial Test	Final Test	Volume Test	Init Temp	Finl Temp	Test Temp	Initial Box	Final Box	Volume Box	I-I Temp	I-O Temp	F-I Temp	F-O Temp	Temp	Time	Delta H	Gamma
1	0.5	136.912	147.189	10.277	72.0	72.0	72.00	637.065	647.542	10.477	74.0	74.0	74.0	76.0	74.50	25.0	1.71792	0.98427
2	1.0	147.391	159.786	12.395	72.0	71.0	71.50	647.742	660.362	12.620	76.0	74.0	75.0	79.0	76.00	21.5	1.73875	0.98797
3	1.5	159.998	174.202	14.204	71.0	71.0	71.00	660.575	675.056	14.481	78.0	75.0	77.0	80.0	77.50	20.5	1.79721	0.98910
4	2.0	174.558	194.942	20.384	71.0	71.0	71.00	675.418	696.206	20.788	80.0	76.0	77.0	81.0	78.50	26.0	1.86815	0.98938
5	2.5	195.122	205.235	10.113	71.0	71.0	71.00	696.409	706.712	10.303	81.0	77.0	77.0	82.0	79.25	11.5	1.85347	0.99051
6	3.0	205.421	216.009	10.588	71.0	71.0	71.00	706.902	717.684	10.782	81.0	77.0	77.0	82.0	79.25	11.0	1.85647	0.98971

R

E.T.S. INC.
METER CONSOLE CALIBRATION FORM

Meter Box No..... 12 REFERENCE CALIBRATOR HH71 CAL-K
THERMOCOUPLE NUMBER 1 Date 20-Sep-94

	Reference Temperature	Thermocouple Temperature	Difference %
1	0	0	0.000
2	32	30	0.407
3	100	98	0.357
4	200	199	0.152
5	300	300	0.000
6	400	399	0.116
7	500	498	0.208
8	600	599	0.094
9	700	699	0.086
10	800	798	0.159
11	900	900	0.000
			0.144 AVERAGE DIFF

Calibration Performed By ..... CARL POWELL

Post Test Calibration-Contract #\- _____

Pre-Test Calibration-Contract #- _____

Comments:

R

E.T.S. INC.
METER CONSOLE CALIBRATION FORM

Meter Box No..... 12 REFERENCE CALIBRATOR HH71 CAL-K
THERMOCOUPLE NUMBER 2 Date 20-Sep-94

	Reference Temperature	Thermocouple Temperature	Difference %	
1	77	75	0.372	
2	100	99	0.179	
3	200	198	0.303	
4	300	298	0.263	
5	400	398	0.233	
6	500	498	0.208	
7	600	600	0.000	
8	700	698	0.172	
9	800	799	0.079	
10	900	899	0.074	
11	0	0	0.000	
			0.171	AVERAGE DIFF

Calibration Performed By ..... CARL POWELL

Post Test Calibration-Contract #\- ----------

Pre-Test Calibration-Contract #- ----------

Comments:

R

E.T.S. INC.
METER CONSOLE CALIBRATION FORM

Meter Box No..... 12 REFERENCE CALIBRATOR HH71 CAL-K
THERMOCOUPLE NUMBER 3 Date 20-Sep-94

	Reference Temperature	Thermocouple Temperature	Difference %
1	85	85	0.000
2	100	99	0.179
3	200	198	0.303
4	300	299	0.132
5	400	398	0.233
6	500	499	0.104
7	600	598	0.189
8	700	698	0.172
9	800	798	0.159
10	900	898	0.147
11	0	0	0.000
			0.147 AVERAGE DIFF

Calibration Performed By ..... CARL POWELL

Post Test Calibration-Contract #\- _____

Pre-Test Calibration-Contract #- _____

Comments:

R

E.T.S. INC.
METER CONSOLE CALIBRATION FORM

Meter Box No..... 12 REFERENCE CALIBRATOR H471 CAL-K
THERMOCOUPLE NUMBER 4 Date 20-Sep-94

	Reference Temperature	Thermocouple Temperature	Difference %
1	0	0	0.000
2	32	31	0.203
3	100	99	0.179
4	200	200	0.000
5	300	298	0.263
6	400	398	0.233
7	500	499	0.104
8	600	598	0.189
9	700	697	0.259
10	800	798	0.159
11	900	898	0.147
			0.158 AVERAGE DIFF

Calibration Performed By ..... CARL POWELL

Post Test Calibration-Contract #\- _____

Pre-Test Calibration-Contract #- _____

Comments:

R

E.T.S. INC.

METER CONSOLE CALIBRATION FORM

Meter Box No..... 12 REFERENCE CALIBRATOR HH71 CAL-K

THERMOCOUPLE NUMBER 5 Date 20-Sep-94

	Reference Temperature	Thermocouple Temperature	Difference %
1	0	0	0.000
2	32	31	0.203
3	100	100	0.000
4	200	198	0.303
5	300	299	0.132
6	400	398	0.233
7	500	498	0.208
8	600	598	0.189
9	700	697	0.259
10	800	798	0.159
11	900	899	0.074
			0.160 AVERAGE DIFF

Calibration Performed By ..... CARL POWELL

Post Test Calibration-Contract #\- _____

Pre-Test Calibration-Contract #- _____

Comments:

R

E.T.S. INC.
METER CONSOLE CALIBRATION FORM

Meter Box No..... 12 REFERENCE CALIBRATOR HH71 CAL-K
THERMOCOUPLE NUMBER 6 Date 20-Sep-94

	Reference Temperature	Thermocouple Temperature	Difference %
1	0	0	0.000
2	32	31	0.203
3	100	100	0.000
4	200	200	0.000
5	300	300	0.000
6	400	399	0.116
7	500	500	0.000
8	600	599	0.094
9	700	699	0.086
10	800	799	0.079
11	900	898	0.147
			0.066 AVERAGE DIFF

Calibration Performed By ..... CARL POWELL

Post Test Calibration-Contract #\- _____

Pre-Test Calibration-Contract #- _____

Comments:

R

E.T.S. INC.
METER CONSOLE CALIBRATION FORM

Meter Box No..... 12 REFERENCE CALIBRATOR HH71 CAL-K
THERMOCOUPLE NUMBER 7 Date 20-Sep-94

	Reference Temperature	Thermocouple Temperature	Difference %
1	0	0	0.000
2	32	32	0.000
3	100	100	0.000
4	200	198	0.303
5	300	300	0.000
6	400	400	0.000
7	500	499	0.104
8	600	600	0.000
9	700	699	0.086
10	800	798	0.159
11	900	899	0.074
			0.066 AVERAGE DIFF

Calibration Performed By ..... CARL POWELL

Post Test Calibration-Contract #\- _____

Pre-Test Calibration-Contract #- _____

Comments:

APPENDIX J

PARTICLE SIZING DATA AND RESULTS

RUN NUMBER	M1-4-R1	
Date	03/09/95	
Start Time	17:57	
End Time	19:00	
Stack Diam.	48	inches
Meter Box Gamma	0.9993	
Meter Box dH@	1.7269	
Barometric	28.50	in.Hg
Cp	0.84	
Test Duration	60	minutes

METHOD 1-4 RESULTS

Metered Volume	42.077	dcf
Volume @ Std.Cond.	40.075	dscf
% Water	20.97	%
Velocity	71.35	ft/sec
Actual Flow	53798	acfm
Std. Flow	44622	scfm
Dry Std. Flow	35264	dscfm

METHOD 4 DATA

	INIT. (ml)	FINAL (ml)	NET (ml)
IMP.1	644.8	846.8	202.0
IMP.2	743.1	748.7	5.6
IMP.3	593.2	598.0	4.8
IMP.4			0.0
IMP.5			0.0
IMP.6			0.0
IMP.7			0.0
TOTAL	1981.1	2193.5	212.4
S.G.	775.9	789.4	13.5

METHOD 3 DATA

%O2	17.6	Md	29.17
%CO2	2.90	Ms	26.83
%CO	0.0	Ps	28.32
%N2	79.5	Fo	1.138
O2+CO2	20.5	%EA	519

POINT	STACK TEMP (DegF)	STATIC (in.WC)	DP (in.WC)	DH (in.WC)	METER VOLUME (dcf)	METER TEMPERATURE INLET (DegF)	METER TEMPERATURE OUTLET (DegF)
1	137		0.65	0.78	137.513	64	64
2	141		1.50	1.80	179.590	66	65
3	141		1.60	1.92		67	65
4	141		1.60	1.92		70	65
5	143		1.70	2.04		70	66
6	143	-2.50	1.90	2.28		72	66
7	143		1.85	2.20		73	66
8	143		1.70	2.04		75	67
9	143		1.45	1.74		75	67
10	144		0.78	0.94		74	67
11	135		0.68	0.82		69	66
12	140		0.74	0.88		71	67
13	144	-2.50	0.88	1.06		72	67
14	144		0.94	1.13		73	68
15	144		1.10	1.32		74	68
16	143		1.20	1.49		74	68
17	145		1.35	1.62		76	69
18	145		1.45	1.74		76	69
19	145		1.48	1.74		76	69
20	145		1.00	1.20		77	70
					179.590		
AVG.	142	-2.50	1.28	1.53	42.077		70

FACILITY [illegible] TEST LOCATION Scrubber Outlet DATE 3/4/95

START TIME 17:57 POLLUTANT Condensibles RUN I.D. Pr-M 4 -01

Point	Sample Time	Clock Time	Static	Stack Temp.	Stack dP	Meter dH	Meter Volume cu.ft.	Meter Temp Inlet	Meter Temp Outlet	Filter Temp.	Imp. Temp.	Meter Vac.
A1	17:57	0		137	.65	.78	137.513	64	64		[illegible]53	[illegible] 4"
2		3		141	1.5	1.8	139.7	66	65		44	5"
3		6		141	1.6	1.92	141.8	67	65		44	5.5"
4		9		141	1.6	1.92	144.4	70	65		45	5.5"
5		12		143	1.7	2.04	146.1	70	66		45	2"
6		15	-25	143	1.9	2.28	148.3	72	66		46	2"
7		18		143	1.85	2.2	150.7	73	66		47	2"
8		21		143	1.7	2.04	153.3	75	67		47	2.5"
9		24		143	1.45	1.74	155.8	75	67		48	2"
10		27		144	.78	.936	158.81	74	67		48	1.5"
B1	18:27 / 18:30	3		135	.68	.816	159.929	69	66		52	1"
2		3		140	.74	.88	161.5	71	67		50	1"
3		6		144	.88	1.056	163.2	72	67		51	1.5"
4		9		144	.94	1.128	164.9	73	68		52	1.5"
5		12		144	1.1	1.32	166.8	74	68		52	1.5"
6		15	-2.5	143	1.2	1.44	168.8	74	68		53	1.5"
7		18		145	1.35	1.62	170.9	76	69		55	1.5"
8		21		145	1.45	1.74	173.2	76	69		56	2"
9		24		145	1.45	1.74	175.3	76	69		58	2"
10		27		145	1.0	1.2	177.6	77	70		59	1"
End	19:00	30					179.590					

CHAIN OF CUSTODY INFORMATION

Container Number	Sample I.D.	Description
F1		Impg. H2O
F2		Acetone Probe Rinse
F3		Acetone Imp. Rinse
F4		Silica Gel
F2	425	F.H. Acetone R.
F3	426	Imp. Contents
F4	430	Silica Gel

LEAK CHECK

Vacuum	15"	15"			
Rate	.001	.001			

IMPINGER VOLUMES

	Initial	Final
#1	644.8	846.8
#2	743.1	748.7
#3	593.2	594.0
#4	275.7	281.4
#5		
#6		

NOZZLE SIZE	.23
METER BOX I.D.	6
GAMMA	.9993
DELTA He	1.7165
BAR. PRESS.	
FILTER I.D.	—
OPERATOR	CS/KP

INTEGRATED BAG ANALYSIS FOR %O2 AND %CO2
INSTRUMENT ANALYZER METHOD 3A

SOURCE: LA-Pacific		LOCATION: Scrubber outlet	
RUN I.D.: 50-M2-R1		ETS CONT. NO.: 95-415	
PROCESS/FUEL TYPE: wood		TECHNICIAN: KBB	
%O2	17.6	%CO2	2.9
%O2	17.6	%CO2	2.9
%O2	17.6	%CO2	2.9
AVERAGE	17.6	AVERAGE	2.9
		Fo FACTOR:	1.138

RUN I.D.: 50-M2-R2		TECHNICIAN: KBB	
%O2	17.3	%CO2	3.1
%O2	17.3	%CO2	3.1
%O2	17.3	%CO2	3.1
AVERAGE	17.3	AVERAGE	3.1
		Fo FACTOR:	1.161

RUN I.D.:		TECHNICIAN:	
%O2		%CO2	
%O2		%CO2	
%O2		%CO2	
AVERAGE		AVERAGE	
		Fo FACTOR:	

Fo = (20.9 - %O2)/%CO2

<u>COMMON Fo FACTORS:</u>

Gas, Natural	(1.600-1.836)	Coal, Bituminous	(1.083-1.230)
Gas, Propane	(1.434-1.586)	Coal, Anthracite	(1.016-1.130)
Wood	(1.000-1.120)	Oil, Distillate	(1.260-1.413)
		Oil, Residual	(1.210-1.370)

RUN NUMBER	SI-M4-R1	
Date	03/10/95	
Start Time	09:10	
End Time	10:40	
Stack Diam.	48	inches
Meter Box Gamma	1.0051	
Meter Box dH@	1.8500	
Barometric	28.50	in.Hg
Cp	0.84	
Test Duration	60	minutes

METHOD 4 DATA

	INIT. (ml)	FINAL (ml)	NET (ml)
IMP.1	614.3	745.0	130.7
IMP.2	730.5	738.3	7.8
IMP.3	593.7	594.6	0.9
IMP.4			0.0
IMP.5			0.0
IMP.6			0.0
IMP.7			0.0
TOTAL	1938.5	2077.9	139.4
S.G.	785.6	797.5	11.9

METHOD 1-4 RESULTS

Metered Volume	33.041	dcf
Volume @ Std.Cond.	31.120	dscf
% Water	18.62	%
Velocity	74.61	ft/sec
Actual Flow	56257	acfm
Std. Flow	44915	scfm
Dry Std. Flow	36550	dscfm

METHOD 3 DATA

%O2	17.5	Md	29.20
%CO2	3.10	Ms	27.11
%CO	0.0	Ps	27.80
%N2	79.4	Fo	1.097
O2+CO2	20.6	%EA	506

POINT	STACK TEMP (DegF)	STATIC (in.WC)	DP (in.WC)	DH (in.WC)	METER VOLUME (dcf)	METER TEMPERATURE INLET (DegF)	METER TEMPERATURE OUTLET (DegF)
1	166	-9.50	1.20	0.88	471.804	72	72
2	168	-9.50	1.30	0.96	489.200	74	74
3	168		1.30	0.96		74	74
4	149		1.20	0.88	490.800	73	73
5	143		1.50	1.10	506.445	76	76
6	145		1.50	1.10		76	76
7	147		1.60	1.10		74	74
8	147		1.40	1.00		74	75
9	149		1.40	1.00		74	76
10	150		1.30	0.96		74	76
11	150		1.30	0.96		74	76
12	150		1.00	0.74		74	76
13	155		1.40	1.00		76	78
14	155		1.30	0.96		76	78
15	154		1.30	0.96		76	78
16	154		1.50	1.10		80	82
17	154		1.50	1.10		80	82
18	160		1.40	1.00		80	82
19	160		1.50	1.10		82	84
20	164		1.40	1.00		82	84
21	156		1.30	0.96		82	84
22	156		1.30	0.96		82	85
23	156		1.00	0.74		83	85
24	152		1.00	0.74		83	85
					506.445		
AVG.	155	-9.50	1.33	0.97	33.041		78

FACILITY LTI Pacific TEST LOCATION Scrubber Inlet DATE 3/10/95

START TIME 9:10 POLLUTANT Particulate/Sizing RUN I.D. SI -M4 -01

Point	Sample Time	Clock Time	Static	Stack Temp.	Stack dP	Meter dH	Meter Volume cu.ft.	Meter Temp Inlet	Meter Temp Outlet	Filter Temp.	Imp. Temp.	Meter Vac.
A1	0	0910		166	1.2	.88	471.804	72	72	—	34	9
2	7.5			168	1.3	.96	473.4	74	74	—	34	9
3	5			168	1.3	.96	474.9	74	74	—	34	9
4	7.5			149	1.2	.88	476.8	73	73	—	34	7
5	10			143	1.5	1.1	478.3	76	76	—	34	8
6	12.5			145	1.5	1.1	479.4	76	76	—	34	12
7	15		-9.5	147	1.6	1.1	481.6	74	74	—	35	8
8	17.5			147	1.4	1.0	482.3	74	75	—	35	7
9	20			149	1.4	1.0	484.3	74	76	—	35	7
10	22.5			150	1.3	.96	485.6	74	76	—	35	7
11	25			150	1.3	.96	486.8	74	76	—	35	7
12	27.5	09		150	1.0	.74	488.6	74	76	—	35	5.5
	30	0940		—	—	—	489.2	—	—	—	—	-
B1	32.5	0942		155	1.4	1.0	490.8	76	78	—	35	15
2	35	1015		155	1.3	.96	492.4	76	78	—	35	3
3	37.5			154	1.3	.96	493.7	76	78	—	35	3
4	40			154	1.5	1.1	495.1	80	82	—	35	3
5	42.5			154	1.5	1.1	496.6	80	82	—	35	3
6	45		-9.5	160	1.4	1.0	498.2	80	82	—	36	3
7	47.5			166	1.5	1.1	499.6	82	84	—	36	3
8	50			164	1.4	1.0	501.0	82	84	—	36	3
9	52.5			156	1.3	.96	502.4	82	84	—	36	3
10	55			156	1.3	.96	503.9	82	85	—	36	3
11	57.5			156	1.0	.74	505.1	83	85	—	36	3
12	60	1040		152	1.0	.74	506.445	83	85	—	36	3

CHAIN OF CUSTODY INFORMATION

Container Number	Sample I.D.	Description
F2	433	Acetone F4
F3	434	Imp 1-3
F7	438	SG

LEAK CHECK

Vacuum	15	~~15~~	15		
Rate	.004	~~.004~~	.018		

IMPINGER VOLUMES

	Initial	Final
#1	614.3	745.0
#2	730.5	738.3
#3	593.7	594.6
#4	785.6	792.5
#5		
#6		

NOZZLE SIZE	0.188
METER BOX I.D.	9
GAMMA	1.0051
DELTA He	1.800
BAR. PRESS.	28.5
FILTER I.D.	—
OPERATOR	CH

INTEGRATED BAG ANALYSIS FOR %O2 AND %CO2
INSTRUMENT ANALYZER METHOD 3A

SOURCE: LA-Pacific		LOCATION: Scrubber Inlet	
RUN I.D.: SI-M2-R1		ETS CONT. NO.: 95-415	
PROCESS/FUEL TYPE: Wood		TECHNICIAN: KAB	
%O2	17.9	%CO2	2.8
%O2	17.8	%CO2	2.8
%O2	17.9	%CO2	2.9
AVERAGE	17.9	AVERAGE	2.8
		Fo FACTOR:	1.071

Part.

RUN I.D.: SI-M2-R2		TECHNICIAN:	
%O2	17.5	%CO2	3.0
%O2	17.5	%CO2	3.1
%O2	17.5	%CO2	3.1
AVERAGE	17.5	AVERAGE	3.1
		Fo FACTOR:	1.6968

RUN I.D.:	TECHNICIAN:
%O2	%CO2
%O2	%CO2
%O2	%CO2
AVERAGE	AVERAGE
	Fo FACTOR:

Fo = (20.9 - %O2)/%CO2

COMMON Fo FACTORS:

Gas, Natural	(1.600-1.836)	Coal, Bituminous	(1.083-1.230)
Gas, Propane	(1.434-1.586)	Coal, Anthracite	(1.016-1.130)
Wood	(1.000-1.120)	Oil, Distillate	(1.260-1.413)
		Oil, Residual	(1.210-1.370)

BAHCO DATA AND RESULTS

ETS CONTRACT : 95-403-T

ETS I.D. : SI-M4-R1

CLIENT : LOUISIANA PACIFIC

NOTE: All sample dust weights include pan weight.

CENTRIFUGE DATA

PAN WEIGHT (grams):	2.6506
AS-IS SAMPLE WT(gms):	2.8261
-100 MESH SAMPLE (gms):	2.8058
BAHCO SAMPLE(gms):	2.7735
PERCENT LESS THAN 100 MESH (150 microns)	88.43

DENSITY DATA

FLASK VOLUME (ml) :	50
FLASK WEIGHT (gms) :	40.6800
SAMPLE + FLASK (grams) :	40.7122
LIQUID DENSITY (gm/cc) :	0.7855
FLSK+LIQU.+SAMP.(grams) :	79.9693
CALCULATED DUST DENSITY =	1.413

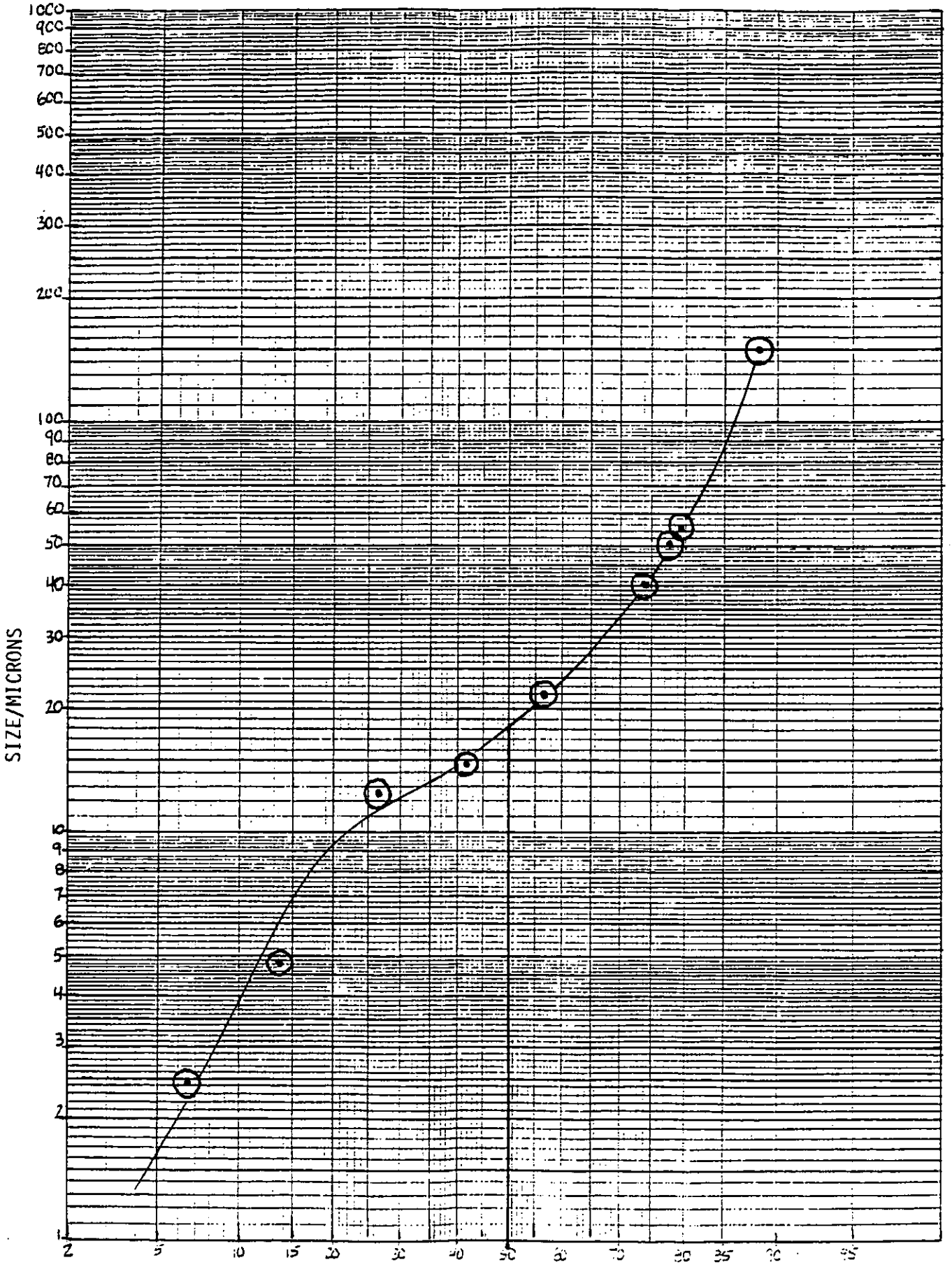
THROTTLE	RESIDUE (grams)	TERMINAL VELOCITY (in/min)	CUMULATIVE PERCENT LESS THAN SIZE	PARTICLE DIAMETER (microns)
18	2.7643	0.62	6.62	2.46
17	2.7545	2.41	13.67	4.86
16	2.7361	16.2	26.91	12.59
14	2.7150	22.1	42.09	14.71
12	2.6938	51.0	57.35	22.35
8	2.6700	168	74.47	40.56
4	2.6651	262	78.00	50.65
0	2.6629	315	79.58	55.54

CALCULATIONS

$$\text{CUM.\% LESS THAN SIZE} = \frac{(\text{BAHCO SAMPLE} - \text{RESIDUE})}{\text{BAHCO SAMPLE}} \times (\text{\% LESS THAN 100 MESH})$$

$$\log(\text{Diameter}) = 0.5705 - 1/2 \times (\log(\text{Density}) - \log(\text{Term.Vel.}))$$

PARTICLE SIZE DISTRIBUTION



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REPORT OF ANALYSIS

March 17, 1995

Terry Williamson
ETS, INC.
1401 Municipal Rd NW
Roanoke, VA 24012-1309

Re: Particle Sizing

ETS: PURCHASE ORDER 5425
ETS: Contract #95-403-T

TWCA S.O. : B-9802-1	
TWCA Sample ID:	J-54603
MEDIAN: 18 μm	Under a microscope, particles up to 120μm were observed.

Distribution table attached.

Bill Beasley
Analytical Laboratory Expeditor

de

FAXED

Document: S:\LABOFFIC\!RPTANAL\MISC\WILSON-T

Analytical results are subject to terms listed on the back

HORIBA CAPA-700 PARTICLE ANALYZER

DATE 3-16-95

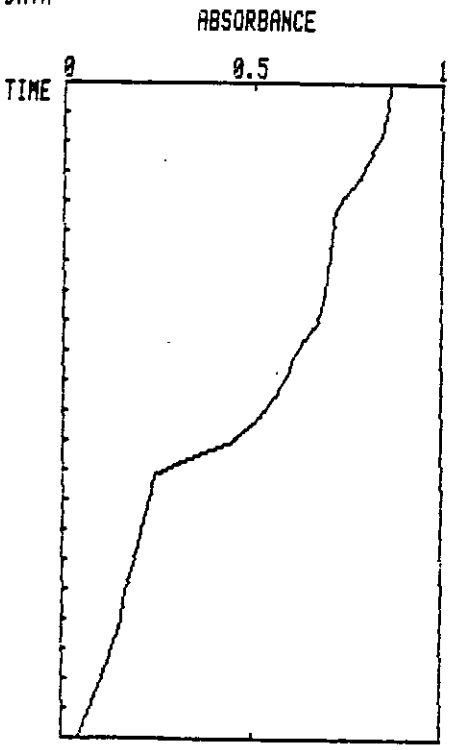
SAMP. J 54603

DISP. A-11

* CONDITIONS

DISP. VISC.	1.54	[cP]
DISP. DENS.	0.76	[g/cc]
SAMP. DENS.	1.41	[g/cc]
D (MAX)	50.00	[μm]
D (MIN)	0.10	[μm]
SPEED	480	[rPm/min]
TIME	0 H 21 M 55 S	
ΔX	10	[mm]
MEASURE MODE	GRADIENT	

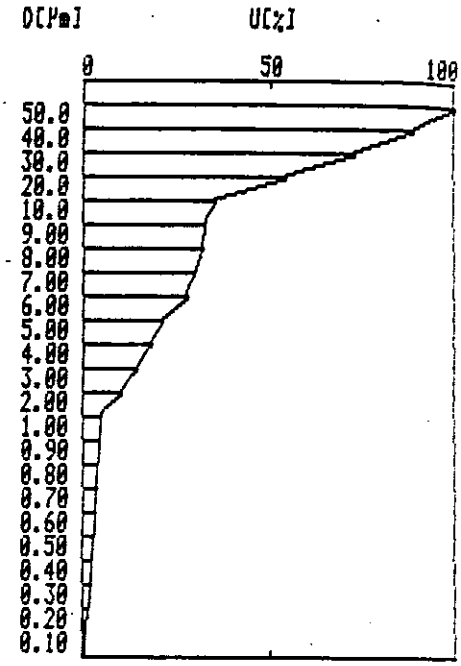
* DATA



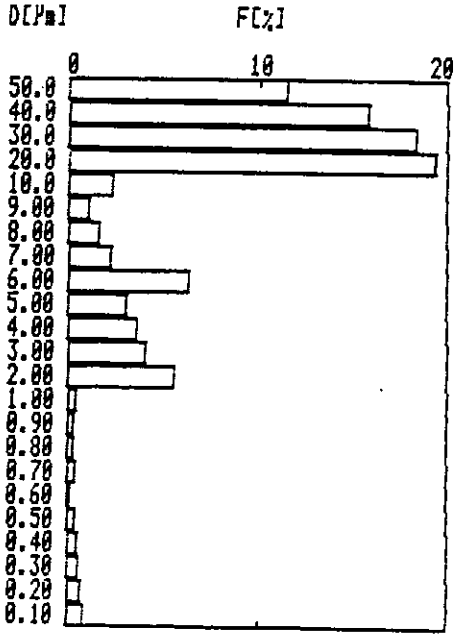
* DISTRIBUTION TABLE (BY VOL.)
(K[D]=OPTIONAL)

D[μm]	F[%]	U[%]
50.0<	0.0	100.0
50.0-40.0	11.5	100.0
40.0-30.0	15.8	88.5
30.0-20.0	18.3	72.7
20.0-10.0	19.3	54.4
10.0-9.00	2.4	35.1
9.00-8.00	1.1	32.7
8.00-7.00	1.7	31.6
7.00-6.00	2.3	29.9
6.00-5.00	6.4	27.6
5.00-4.00	3.1	21.2
4.00-3.00	3.7	18.1
3.00-2.00	4.1	14.4
2.00-1.00	5.7	10.3
1.00-0.90	0.4	4.6
0.90-0.80	0.3	4.2
0.80-0.70	0.3	3.9
0.70-0.60	0.4	3.6
0.60-0.50	0.1	3.2
0.50-0.40	0.4	3.1
0.40-0.30	0.5	2.7
0.30-0.20	0.6	2.2
0.20-0.10	0.7	1.6
0.10-0.00	0.9	0.9

D (MEDIAN)	17.72	[μm]
SD	14.56	[μm]
Sw	1.664	[m²/g]



* DISTRIBUTION GRAPH (BY VOL.)
(k[D]=OPTIONAL)



Carbon?

J 54603

Median 18μm

Note: Under a microscope, particle up to 120μm were observed.

D Ball

H-1538